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DURING the course of a discussion before the Hanover Section of the German Society of Engineers, on a paper dealing with the Loiseau process of manufacturing artificial fuel, some points were brought up in regard to the treatment of lignites which may be of value to those in the West to whom only that fuel is accessible. Experiments have been made by F. FISCHER with lignite containing 60 per cent of water and having a calorific value, when coming from the mine, of from 1000 to 1500, and when dry of from 3000 to 3500. He found, after a series of trials with an experimental plant, that the best temperature for coking lignite with the aid of steam was 450 degrees Celsius, obtaining thereby 32 per cent of the weight of the moist lignite in the form of coke, holding from 6 to 7 per cent of ash, and having a calorific value of 7500, equal to a fair bituminous coal. Coking lignite with superheated steam has been for many years in practical operation at Vordernberg, Austria.

FRANCE glories in a new mining paper, paying special attention to gold, silver, copper, and diamond mining enterprises. The *Bulletin des Mines*, as our new friend is called, appears to be quite an enterprising journal, and has a wonderfully well-posted American "correspondent," who, we shall be rash enough to presume, resides somewhere in this country. That person promptly appropriated an article on the Lexington mill, written by Mr. C. A. STETEFELDT ; but finding it impossible to appreciate some of the most important sections of the paper, dealing with intricate metallurgical questions, let them severely alone, simply sweeping them aside, because lacking the brains to understand their value. He took unto himself all the facts submitted to the public through the ENGINEERING AND MINING JOURNAL by Mr. MEDHURST, of the Lexington Company, and calmly submitted them as the result of his own profound researches, until, emboldened by success, he threw aside a thin disguise, and appeared upon the scene as the editor in person! In our issue of March 31st, Dr. EDWARD D. PETERS, Jr., of this city, warned our readers against the processes for the electro-amalgamation of gold ores, which are now attracting so much attention in England, and it seems in France. In the last issue of the *Bulletin*, we find this communication in full, but without any signature, prefaced with the following words, "The following letter has been sent to us," and to its end we find tacked the following bit of editorial comment : "Without wishing to displease our correspondent, we persist in believing that the last word has not been spoken on the treatment of ores by electricity. We shall perhaps before a long time prove that it is capable of being practically solved." We are glad to see that the editor is afraid to displease Dr. PETERS, although an ocean rolls between them, and although that gentleman probably does not know of the existence of the polite but unscrupulous editor of the *Bulletin*, who is welcome to the valuable matter he finds in the ENGINEERING AND MINING JOURNAL, which he may "translate" as much as he likes without giving credit, so long as it does not bear the full signature of a correspondent or appear as an original paper by a contributor whose full name is published. In such cases, we cease to be indifferent, and must insist that full credit be given at least to the writer, if not to the JOURNAL.

THE island of Elba has for many centuries enjoyed the reputation of being an inexhaustible treasure-house of iron ore. These illusions have been rudely shaken of late by the careful study of the deposits by competent engineers. FABRI, PELLATI, MELLINI, and CZYSZKONSKI have in turn cut down the estimates of the ore in sight, and now MM. JEAN BECO and LEON THONARD, in a very interesting paper contributed to the *Revue Universelle des Mines*, furnish additional evidence pointing to the early exhaustion of the mines of Elba. The source of the enormous aggregate production of iron ore from the island was five deposits, named, in their order going from north to south, Rio Albano, Rio, Vigneria, Terra-Nera, and Calamita. Large quantities of mineral were and are still obtained by washing the ancient dumps. The greatest mine, the Rio, is estimated to have yielded between twenty and twenty-five million tons of ore; and yet, with the adjacent Vigneria, it does not contain more than three million tons still in place. Terra-Nera is practically exhausted, while Rio Albano is still good for two million tons. Calamita has apparently two million tons of magnetite, and may develop great resources ; but as the ore is much mixed with rock and copper pyrites, many believe that the deposit does not hold much marketable ore. MM. BECO and THONARD put it down for one million. The old dumps have been similarly overestimated, and, according to recent observations, are not regarded as capable of furnishing one million tons ; thus carrying the total to approximately seven millions of tons, which would furnish supplies for only thirty-five years at the rate of 200,000 tons per annum. If any effort is to be made to build up an Italian iron industry consuming at the rate of 100,000 tons of ore per annum, an export of iron ores to any extent can not be thought of. MM. BECO and THONARD urge that, however gloomy this outlook for Elba may appear, the prospects are not much better for Africa and Spain. The mine at Bone, Africa, is exhausted, and the Mokta, which, twenty years since, held out such a brilliant future, is not far from its end, so that the company owning it had to buy at a high price the Tafna mines, east of Oran, and was forced to provide at great expense new shipping docks. The famous Sommorostro mines near Bilbao, Spain, have been similarly overestimated. A few years ago, the ore in sight was placed at one hundred millions of tons ; but recent investigations have cut that figure down to one tenth.

Should these statements be borne out by the facts—and so far as Elba is concerned, they can not be much shaken—then the year 1890 may witness some very important changes in the iron industry of the world. England, France, and Germany are getting to be more and more dependent for supplies of ores upon the very countries named, and are taking ever-increasing quantities of foreign ores. Should the more accessible deposits become exhausted, or be unable to maintain their present enormous rate of export, the prices of ores would be increased by the greater cost of developing new ore ground at a greater distance from the coast, thus bringing foreign iron-masters closer to our level so far as access to ores is concerned. The prospect is one which may well serve as a consolation to our poor Lake Superior ore miners, who are now subjected to such intense suffering because they can not sell all the ore they have mined, and propose to take out this year at the bedrock price from $5 to $8 per ton at Cleveland.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not ho ourselves responsible for the opinions of our correspondents.]

Our Mining Interests.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: There are some facts in the mining statistics from Colorado this year, which unavoidably set one to thinking whether taking out from the earth's depths its mineral deposits of gold and silver is not a safer and more profitable and legitimate business than much that Americans have heretofore considered as their secure and more conservative enterprises.

We see by the statistics in regard to Leadville production, that the output of bullion has steadily increased since 1879, when its gigantic stock companies were floated, from $10,333,740.69 to $18,220,892.64 in 1882. Notwithstanding the gross mismanagement which at that early period loaded the entire district down with stock companies of monstrous size, there has been a steady increase annually of the output of the precious metals.

The whole bullion product of the State for 1882 was $26,750,898, which, according to a mathematical authority, would provide each family in the State with a sum of over $400, which is, we believe, considerably in excess of the results shown per family in the agricultural and manufacturing States. In one county, San Juan, we notice that, with the advent of a railroad in July last, the bullion output sprang from an average for several years of about $25,000 to an average of over a million dollars. There certainly seems to be something worth thinking about in all this. If, with poor management and ill-tempered speculation, and hostile criticisms, and holdings aloof by capitalists, mining districts can go steadily forward, increasing by solid millions each year their product of gold and silver, and almost doubling it in the course of five years, it is a question whether there is not a field in Colorado, and probably in other Western States, for the immediate employment of American capital in safer and vastly more profitable investments than those usually made in other forms of business. We speak entirely of legitimate mining and not of illegitimate stocking. And it would also seem that, unless we seize the opportunity, the English and other people will realize the better part of the business. Already during 1882, several of the lodes or mineral veins of the San Juan have changed hands, and the new owners have been English parties. These people have for a great many years made mining a legitimate and profitable business in other countries than the United States. That many of their investments here have not proved profitable has been because hitherto they have purchased stocks in outrageously overstocked mines, as they have also done in some of our outrageously overstocked railroads, and losses in both cases have been the result. Their present system seems eminently the wise one, that of buying at fair figures the controlling interest in mines, and then working them for the output.

This is legitimate mining, as building a railroad at fair cost is legitimate railroading. The statistics of mining show that, even as badly managed as the business has been in this country by speculators, yet the actual capital invested in mining has given a profit of something over 18 per cent. Of course, capital invested in mining does not include amounts for which property may be stocked. A mine that would be cheap property at one hundred thousand dollars, and possibly prove a bonanza to its owners, can be crushed and loaded down with a stock issue of from five to ten millions of dollars, and then "skinned" for a year, in order that a forced production of ore may sell the stock on the market. Then the next step may be to "hammer" the stock and decry the mine, so that the great multitude is glad to get out at any price, while a few sharp tricksters get the property at pretty much their own figures.

The great showing of Colorado for 1882, with only part of its mines yet reached by railroads, and the fact that much-abused Leadville has constantly increased its bullion product, and almost doubled it since the days of the big excitement, show that even mismanagement, while it may bring stock speculators to grief, yet can not crush the business of mining, which is as old as man himself. Take this same Leadville, as perhaps the most ready example at hand. Suppose that any of the ill-managed banks, iron mills, or railroads, the ownership of stock in which has caused considerable grief, were asked for a show of assets since the time their stock went down with a run. It would be a novel showing indeed for them could the assets be proved to have increased annually, notwithstanding their troubles, and at the end of five years to be yielding almost double what they did in their time of greatest prosperity.

Indeed, it seems very much as if the miners of the Centennial State could very fairly twit their conservative brethren of the East with being engaged in very much the most hazardous kinds of business.

The number of highly respectable banks, rolling-mills, railroads, factories, and what not that have plunged their stockholders and owners into weeping and wailing in the twelve months sets one to thinking and asking, How shall American capital be invested? And why can not the taking out of the precious minerals be the safest business that speculative man indulges in to-day? Suppose that a man or a set of men purchase a mining property, for instance, a fissure-vein that has been developed sufficiently to demonstrate the existence of a body of promising mineral. Suppose they set men and appliances at work to mine the ore, the same as coal is mined for shipment to a market, using the same good judgment and the same economical use of labor that the owner of a coal mine uses in mining his coal and shipping it to market for a profit. With gold and silver ores, the immediate product is cash, solid cash, and nothing else; no credit given, no trusting on time sales with payments running into months and years; no material and no manufactured stock to carry, subject to the ups and downs of commercial and manufacturing life.

If they find the mining and shipping of ores profitable, well and good; they are satisfied, and the business goes steadily forward year after year, yielding its 10, 20, 50, or more per cent of profit. Should a time ever come when the ores can not be profitably mined and shipped, they stop work. There would be comparatively little dead material on hand except the mine itself, which, in its past working, may have paid for itself a hundred-fold, as mines have done time and again. At any time, and on very short notice, they can stop work and be quit of it all, at least, and need not take a year, or five years, to be able to let go of the thing, as it does in many other forms of business.

As a fair illustration perhaps of what legitimate mining may accomplish, the Rio Tinto mine, capital six million pounds sterling, managed by English capital, and the Tharsis, capital one million pounds sterling, also owned and managed by an English company, and both situated in Spain, may be cited. The total value of the different minerals taken from these mines is but $10 per ton, being less than one seventh of the value of what would be called very ordinary ore in America. And yet the Tharsis mine, which is now an old one, sells in London at £45 for £10 shares. The Rio Tinto, which is yet but a few years old, sells at £17 for £10 shares, with a constantly increasing value. These figures may fairly give an inkling of the future that awaits the great mineral deposits of Colorado when business management has fairly taken, as it is now rapidly doing, the place of mere stock speculation.

An eminent English engineer, while lately examining the large fissure-veins of the San Juan region, in Colorado, declared that English companies could make all the money they desired from such masses of mineral if they should yield but $20 per ton of silver. As the average of the large bodies of mineral in the San Juan is stated to be about $60 per ton, it would seem as if legitimate mining might be made rather profitable there.

From the statistics of mining the world over, it would at least seem fairly certain that *legitimate* mining can rather more than hold its own, in comparison with other methods of popular investment. One can have the reins of venture more firmly in hand if he will, than either in railroading or manufacturing, and whatever product he may get certainly possesses the advantage of a universal and fairly regular market. He can own and entirely control his venture, which is rather more than can be said of the ordinary stocks and bonds that seek and very often ingulf the investing public. As we have before remarked, mines can be stocked illegitimately and worked disastrously, as many railroads and financial institutions are, or they can be worked legitimately for their output, and fortunes be realized by their owners. We believe also that they can be worked on a prudent basis more easily, and let go of more quickly when one wishes, than is the case in many other ventures.

NEW YORK, May 10, 1883. W. E. W.

The Bessemerizing of Copper Matte.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of April 21st, I stated that I *believed* that oxidizing copper sulphides by a blast of air so rapidly as to generate a great quantity of available heat (to which I perhaps too closely restricted the term Bessemerizing) had been first described by Hollway, as applied to rotating Bessemer converters, and first by myself, as applied to reverberatories. I did not then, nor can I now, make a positive statement, not having leisure for the complete study of the history of the subject which should precede such a statement. Perhaps I should have limited the supposed priority to utilizing the heat so generated for fusing fresh portions of sulphides, which is indeed the important point claimed by Hollway and by Eustis and myself.

Messrs. Johnsson and Raht reply, in your issue of May 5th, by quoting the processes of Raht, of Jossa and Laletin, of Rittinger, and of Stridsberg and Kollberg. The patent of W. L. Raht, which I suppose to be the one referred to, as given in your 27th volume, page 260, does not even suggest the generation of heat at all. Jossa and Laletin indeed treated matte in a Bessemer converter. But I can not find that they looked for any *great* generation of available heat. In their calculations, they counted on making two blows a day in each converter. Besides strongly preheating the converter, they evidently considered that it might be necessary to add fuel, and even melted cast-iron, to keep up the heat. Their blows lasted as long as two hours, while Hollway's required only from 11 to 18 minutes in his first series of trials.

From this, I infer that they hardly contemplated generating more heat than that needed to make up for the losses by radiation, etc. As with this process, so with those of Tessié du Motay, of Rittinger, of Keates, and others, it was, perhaps, foreseen that a certain amount of heat would be generated; but I find no proposal to generate in this way an amount of available heat which could be called great, when compared with that projected by Hollway and by Eustis and myself. Of course, my failure to find such a proposal recorded does not prove that it does not exist.

From what Mr. Johnsson says as to the origin of the ideas which he claims, we must admit that he may be simply the victim of an unfortunate chain of circumstances. H. M. HOWE.

BOSTON, May 15, 1883.

Arsenic and Zinc in Pyrites.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I must take exception to some parts of Mr. Whitmore's article in your issue of the 12th inst. He says he has "been informed" that the Rowe ore (Davis mine) contains as much arsenic as the Milan. This I most emphatically deny. The ore from the Davis mine has no trace of arsenic in its composition. We have a laboratory at the mine, with all the necessary chemicals and apparatus for arsenic tests by at least two methods, our chemicals being bought from Messrs. Eimer & Amend. I challenge Mr. Whitmore, or any reputable chemist he may send to our mine, to take samples from the mine directly and obtain therefrom in our laboratory the faintest trace of arsenic.

Mr. Whitmore further says (probably has been informed) that on top of pyrites deposits are usually found zinc and galena. I beg to say that I have seen several pyrites mines, and so far the only one of which this is true is the Milan mine.

He also states that J. D., Jr., says our ore is soft. If I remember correctly, J. D., Jr., says that it is granular in structure, rendering it easily broken. To this fact is largely due its remarkable free-burning quality and its dense gas. With our ore, at least one third less brick is required to build the kilns, and one third less iron for

supporting pont, etc. This is an important item in first cost. An average of several thousand tons of our ore actually made into acid by different firms shows over 45 per cent sulphur recovered. Our ore contains no deleterious impurity, and almost no silica.

Nearly one thousand tons of our ore are burned monthly at present, and the quantity is gradually increasing. I shall be glad to have any one interested in burning pyrites personally or by representative visit and examine our mine, and obtain ocular information. We have two hundred thousand tons of ore that can be seen in the mine, and ten thousand tons which we have raised to the top of the ground. We are raising two thousand tons monthly, and have sufficient hoisting power erected to increase this to seven thousand tons.

I think too many wild statements have been made on this subject by parties interested in the sale of ore. Acid-makers can accurately calculate the relative cost of brimstone and pyrites after they know for a certainty where a permanent supply of first-class ore can be obtained, and its price, delivered at a certain point. As far as transportation to market is concerned, we certainly are advantageously situated.

The Davis mine is in the town of Rowe, Franklin County, Mass.; is four miles from the railroad at Charlemont, and eight miles from the Hoosac Tunnel. Every rod of the road is descending from the mine to the railroad. We can easily and cheaply build a gravity or tram railroad whenever required. The railroad is owned by the State of Massachusetts, and all connecting lines have equal privileges and rates. Four lines already run over this road, namely, the Boston, Hoosac Tunnel & Western and the Troy & Greenfield Railroad run to tide-water at Troy, 60 miles; the Fitchburg Railroad to Boston, 119 miles; and the New Haven & Northampton Company, to New Haven, 108 miles. We are now shipping to these points. Thanking you for your valuable space,

I am, yours truly, H. J. DAVIS.

CHARLEMONT, MASS., May 16.

NEW PUBLICATIONS.

ELECTRO-MAGNETS: THE DETERMINATION OF THE ELEMENTS OF THEIR CONSTRUCTION. By TH. DU MONCEL. (Translated from the Second Edition.) New York: D. Van Nostrand. 1883. 18mo, 122 pages.

The reputation of the Count du Moncel as a practical electrician, a scientific investigator, and a writer on subjects connected with electrical science is so thoroughly established that this little book scarcely needs a recommendation. To all who are engaged in the practical construction of electro-magnets, it will be extremely useful. The mathematical investigations connected with this subject are of so high an order that it is difficult to separate that which is practical from that which is purely theoretical. This Du Moncel has done, verifying the formulas adopted by the most careful experimental research. If we are not mistaken, this intelligent and satisfactory translation was made by Prof. G. W. Plympton, the accomplished editor of Van Nostrand's *Engineering Magazine*.

POCKET LOGARITHMS TO FOUR PLACES OF DECIMALS, *including Logarithms of Numbers and Logarithmic Sines and Tangents to Single Numbers; to which is added a Table of Natural Sines, Tangents, and Cotangents.* New York: D. Van Nostrand. 1883. 18mo, 139 pages.

To the practical computer, a table of four-place logarithms is extremely useful, especially in astronomical, geodetic, and electrical field-work. For office use, the card form is perhaps the most desirable; but for use in the field, nothing could be more convenient than this little book. It is clearly printed, and small enough to be carried in the pocket. The table of Natural Trigonometrical Ratios is a very useful addition. It is rarely given, though it always ought to be, in connection with logarithmic tables.

TECHNOLOGISCHES WÖRTERBUCH IN ENGLISCHER UND DEUTSCHER SPRACHE. (Technical Dictionary, English and German.) By GUSTAV EGER. Part I. English-German. Revised by OTTO BRANDES. Brunswick: Vieweg und Sohn. New York: B. Westermann & Co. 1882. 8vo, 710 pages. Unbound, $4.40.

Technical dictionaries are of all the most difficult to compile, and are usually among the most unsatisfactory. In all branches of arts and manufactures, there are so many local terms, and in the different languages there are words used to designate so many different things, that the task becomes fairly bewildering. There is another circumstance which tells against such works. Technical dictionaries often fall into the hands of persons who have not even a faint notion of the subject they have taken in hand. Such persons seize at haphazard one out of many words before them, and build up with much toil and much ignorance those wonderful translations that occasionally startle and amuse the public. Naturally an incompetent translator tries to fix the blame on the technical dictionary. In the work before us, brief explanations are occasionally given of obscure terms. Examination of words in engineering, mining, and metallurgical practice shows careful work, and the long list of names of gentlemen who have aided in the compilation gives assurance that other departments have not been neglected. Prof. J. G. Lunge, of Zurich, has supervised chemistry and chemical industries; Mr. G. Schaeffer, of Newcastle-on-Tyne, engineering; Dr. Bedson, of Manchester, mining and metallurgy; Dr. Burghardt, mineralogy; Dr. Carnelly, botany; and Mr. W. Carleton Williams, forestry, these three last-named gentlemen being also of Manchester.

SMELTING PLANTS. By JOSEPH M. LOCKE, C.E., M.E. Cincinnati: Published by the Lane & Bodley Company. Square 8vo, 26 pages, illustrated.

With the object of educating their customers, many of our manufacturers of machinery are beginning to publish brief monographs, elementary in their character generally, on the particular branch of their business in which experience has taught them such enlightenment is necessary. However much the fact may be deplored that parties having no knowledge of the working or the adaptability of a given kind of plant are the ones who order it, our machinery firms have to meet the case as they find it. They take orders from any responsible party; and though it can not be a matter of indifference to them whether the machinery will rust away in some nook in the mountains after a brief spurt of activity, they do the best thing under the circumstances, in advising and instructing their customers. The little book before us, containing only 26 pages, handsomely printed and well illustrated, is a good example of the class of literature which these circumstances have called forth. It does not pretend to give any data with which every practical smelter is not thoroughly familiar; but it does furnish information, well arranged, to those who probably never saw a copper or lead smelting furnace before. The first chapter contains a good description of the water-jacket furnace built by the Lane & Bodley Company; the second is entitled, "The Selection of the Site of Smelting Plants, and the Adaptation and Equalization of the Plant." We are particularly struck with the utility of the latter chapter. By following the hints there given, many stupid blunders committed in the past may be avoided in the future.

DESCRIPTION OF THE PORTER-ALLEN ENGINE. By CHARLES T. PORTER. Philadelphia: Published by the Southwark Foundry and Machine Company. 1883.

After many years of work, sustained by an enthusiastic conviction of the correctness of his views on steam engineering, Mr. Charles T. Porter has had the gratification of seeing the engines built in accordance with his plans gaining rapidly in favor as mill engines, in rolling-mills, steel-works, etc. The work before us—for it rises far above the level of the ordinary trade catalogue—gives a description in detail of the different parts of the engines, and enters into a discussion of the advantages of high speed, of the conversion of heat into work in the cylinder, of the attainable limit of economy, the merits of superheating, as against steam-jacketing, etc. The book is beautifully illustrated, and should be studied closely by all who have the management of undertakings in which economy of fuel and efficiency are important factors.

THE ASSAYER'S MANUAL. By BRUNO KERL. Translated from the German by WILLIAM T. BRANNT. Edited by WILLIAM H. WAHL, Ph.D. Philadelphia: Henry Carey Baird & Co. 8vo, 301 pages. (*Index.*) $3.

Prof. Bruno Kerl's great merits as a book-maker as well as his faults are fully understood by metallurgists and mining engineers, his treatises having served generations as works of reference and of study. His industry as a compiler is occasionally marred by his lack of judgment and by his apparent faith in every thing that has received the dignity of print. The practicability of easily and thoroughly testing the accuracy of methods of assaying proposed, and a very long personal experience as a teacher, have made it possible to eliminate faults which his other works exhibit; and therefore both his treatise and his manual on assaying are more accurate and complete than his metallurgical works. His earlier and larger work, of which a second edition was recently published, is extremely elaborate, and is a very valuable book of reference for the assayer's office. Professor Kerl, however, in 1879, wisely published an abridgment, and it is this manual which has now been made available to American readers. Professor Kerl is methodical in this as in all his works. He carefully describes the mechanical and chemical operations, furnaces, tools, appliances, and reagents. In the second part, he goes into a detailed account of the different methods of assaying lead, copper, silver, gold, platinum, nickel, cobalt, zinc, cadmium, tin, bismuth, mercury, antimony, arsenic, uranium, chromium, manganese, and fuels. Iron and steel are entirely omitted as having a field of their own. He has carefully brought up to date all the methods, and we note only a few minor omissions; for instance, the addition of fine silver in assaying slags for lead.

The translation is good, although we notice that occasionally translator and editor have evidently despaired of rendering some of the German technical words, and have printed them without a word of explanation. Thus, on page 134, we find "Darrkupfer," "Fluthafter," "Kiehnstöcke." We may state that "After" or "Fluthafter" are the tailings of dressing-works. "Darrkupfer" and Kiehnstöcke" are the residues of working argentiferous copper by two obsolete processes, by fusion with lead and by subsequent liquation.

The book is well printed and strongly bound, fitting it to resist the hard usage to which such books are occasionally put in the laboratory.

LARGE ANVIL-BLOCKS FOR STEEL-WORKS.

Owing to the rapid and very extensive growth of the manufacture of Siemens steel in Scotland, there has been a somewhat extraordinary demand, says *Engineering*, for large anvil-blocks north of the Tweed within the past few years, and during the past week two, of immense size, have been cast. Until now, there has not been any anvil-block in Scotland weighing more than 140 tons; but on Saturday of last week, one was cast at the Dalziel Steel-Works, Motherwell (Messrs. Colville's), which is said to contain 170 tons of metal, and there is in progress at the steel-works of the Govan Forge and Steel Company, Glasgow, an anvil-block which is estimated eventually to contain about 165 tons of metal. In both cases, these anvil-blocks are intended for use with 12-ton steam-hammers, of which there are already several in regular work in Scotland. The Govan anvil-block will be in two pieces, the larger of which, weighing about 140 tons, was cast last Saturday, in the presence of a large number of representatives of the engineering and allied branches of industry. It was cast in a mold occupying the position which the block will eventually occupy after it has been slowly cooled, and has been canted over upon its proper base. The other portion, which will form the top piece or swage-block, and will weigh about 25 tons, will be cast within the next few days. The mixture used in the anvil-blocks under consideration was about one fourth No. 3 Gartsherrie pig-iron and three fourths scrap cast-iron, two of Ireland's patent cupola furnaces, each capable of melting six tons of metal per hour, being used in the operation and the blast being obtained from a No. 7 Root's blower. The manufacture of this anvil-block is intrusted to Mr. William Ireland, of Manchester, who, during the last fifteen or twenty years, has had a most extensive and peculiar experience in connection with the casting of such blocks, both in this country and in Germany; indeed, in the last-named country he has superintended the construction of somewhere about thirty, of which no fewer than thirteen, of a total of 2000 tons, were made for the Union Company, of Dortmund, five of them being blocks of 175 tons each. For the Osnabrück Steel and Iron Company Mr. Ireland made three blocks, one of which weighed 250 tons, which, like the Govan and Motherwell blocks, was intended for use with a 12-ton hammer.

THE APPLICATION OF ELECTRICITY TO EXPLOSIVE PURPOSES.

Sir F. A. Abel, in the course of a recent lecture before the Institution of Civil Engineers, spoke on the application of electricity to the explosion of submarine mines, for purposes of defense and attack, which received some attention from the Russians during the Crimean war under the direction of Jacobi; thus a torpedo, arranged to be exploded electrically when coming into collision with a vessel, was discovered at Yeni-Kale, during the Kertsch expedition in 1855. Some arrangements were made by the British, at the conclusion of the war, to apply electricity to the explosion of large powder charges for the removal of sunken ships, etc., in Sebastopol and Cronstadt harbors. In 1859, a system of submarine mines, to be fired through the agency of electricity by operators on shore, was arranged by Von Ebner for the defense of Venice, which, however, never came into practical operation. Early in 1860, Henley's large magneto-electric machine, with a supply of Abel fuses, and stout India-rubber bags, with fittings to resist water pressure, was dispatched to China, for use in the Peiho River, but no application appears to have been made of it. The subject of the utilization of electricity for purposes of defense, however, did not receive systematic investigation in England or other countries until some years afterward, when the great importance of submarine mines as engines of war was demonstrated by the number of ships destroyed and injured during the war in America. The application of electricity to the explosion of submarine mines was very limited during that war; but arrangements for its extensive employment were far advanced in the hands of both the Federals and confederates at the close of the war; men of very high qualifications, such as Captain Maury, Mr. N. J. Holmes, and Captain McEvoy, having worked arduously and successfully at the subject.

The explosion of submerged powder charges by mechanical contrivances, either of self-acting nature or to be set into action at desired periods, was accomplished as far back as 1583 during the siege of Antwerp by the Duke of Parma; and from that period to 1854 mechanical devices of more or less ingenious and practical character have been from time to time applied to some small extent in different countries for the explosion of torpedoes. The Russians were the first to apply self-acting mechanical torpedoes with any prospect of success, and had the machines used for the defense of the Baltic been of larger size (they only contained eight or nine pounds of gunpowder), their presence would probably have proved very disastrous to some of the English ships which came into collision with and exploded them. Various mechanical devices for effecting the explosion of torpedoes by their collision with a ship were employed by the Americans, a few of which proved very effective. But although, in point of simplicity and cost, a system of defense by means of mechanical torpedoes possesses decided advantages over any extensive arrangements for exploding submarine mines by electric agency, their employment is attended by such considerable risk of accident to those at whose hands they receive application that, under many circumstances which are likely to occur, they become almost as great a source of danger to friend as to foe.

The most important advantages secured by the application of electricity as an exploding agent of submarine mines are as follows: They may be placed in position with absolute safety to the operators, and rendered active or passive at any moment from the shore; the waters which they are employed to defend are therefore never closed to friendly vessels until immediately before the approach of an enemy; they can be fixed at any depth beneath the surface (while mechanical torpedoes must be situated directly or nearly in the path of a passing ship), and they may be removed with as much safety as attends their application.

There are two distinct systems of applying electricity to the explosion of submarine mines. The most simple is that in which the explosion is made dependent upon the completion of the electric circuit by operators stationed at one or more posts of observation on shore; such a system depends, however, for efficiency, on the experience, harmonious action, and constant vigilance of the operators at the exploding and observing stations, and is, moreover, entirely useless at night, and in any but clear weather. The other, which may also be used in conjunction with the foregoing, is that of self-acting mines, exploded either by collision with the ship, whereby circuit is completed through the inclosed fuse, or by the vessel striking a circuit-closer, whereupon either the mine, moored at some depth beneath, is at once fired, or the necessary signal is given to the operator on shore.

Continental nations have followed in the footsteps of the English, in providing themselves with equipments for defensive purposes by submarine mines, and the Danes, Swedes, and Norwegians have pursued the subject of submarine mines with special activity and success. In the United States, the subject of the utilization of electricity as an exploding agent for war purposes is actively pursued, and important improvements in exploding instruments, electric fuses, and other appliances have been made by Smith, Farmer, Hill, Striedinger, and others already mentioned, while no individual has made more important contributions to the development of the service of submarine explosions than General Abbot, of the United States Engineers.

Illustrations of actual results capable of being produced in warfare by submarine operations have hitherto been very few; but of the moral effects of submarine mines there have already been abundant illustrations. In the war carried on for six years by the empire of Brazil and the republic of Uruguay and the Argentine Republic of Paraguay, the latter managed by means of submarine mines to keep at bay for the whole period the Brazilian fleet of fifteen iron-clads and sixty other men-of-war. In the Russo-Turkish war, submarine mines and torpedoes were a source of continued apprehension, and the French naval superiority was paralyzed during the Franco-German war by the existence, or reputed existence, of mines in the Elbe.

The application of electricity to the explosion of military mines and to the demolition of works and buildings has been of great importance in recent wars in expediting and facilitating the work of the military engineer. The rapidity with which guns, carriages, etc., were disabled and destroyed by a small party of men who landed after the silencing of the forts at Alexandria illustrated the advantages of electrical exploding arrangements, combined with the great facility afforded for rapid operations by the power possessed of developing the most violent action of gun-cotton, dynamite, etc., through the agency of a detonator.

The application of electricity to the explosion of mines for land-defenses during active war is not an easy operation, inasmuch as not only the preparation of the mines, but also the concealment of electric cables and all appliances from the enemy, entails great difficulties, unless the necessary arrangements have been made in ample time to prevent a knowledge of them reaching the enemy.

But few words need be said to recall to the minds of civil engineers the facilities which the employment of electricity to explosive purposes affords for expediting the carrying out of many kinds of works in which they are immediately interested. Electrical blasting, especially in combination with rock-boring machines, has revolutionized the operations of tunneling and of driving galleries; and although, in ordinary mining and quarrying operations, the additional cost involved in the employment of fuses, conductors, and the exploding machine, is not unfrequently a serious consideration, there are, even in those directions, many occasions when the power of firing a number of shots simultaneously is of great importance. There is little doubt, moreover, that accidents in mining and quarrying would be considerably reduced in number if electrical blasting were more frequently employed.

The conveniences presented by electric firing arrangements, under special circumstances, were interestingly illustrated by a novel proceeding at the launch of a large screw steamer at Kinghorn, in Scotland, which was recently accomplished by placing small charges of dynamite in the wedge-blocks along the sides of the keel, and exploding them in pairs, hydraulic power being applied at the moment that the last wedge was shot away.

In the deepening of harbors and rivers, and in the removal of natural or artificial submerged obstructions, the advantages of electric firing are so obvious that extended reference to them is unnecessary.

A substitute for electrical firing, which has been applied with success to the practically simultaneous firing of several charges, consists of a simple modification of the Bickford fuse, which, instead of burning slowly, flashes rapidly into flame throughout its length, and hence has received the name of instantaneous fuse or lightning fuse. The fuse burns at the rate of about 100 feet per second; it has the general appearance of the ordinary mining fuse, but is distinguished from the latter by a colored external coating. Numerous lengths of this fuse are readily coupled up together, so as to form branches leading to different shot-holes, which may be ignited together, so as to fire the holes simultaneously. In the navy, this fuse is used as a means of firing small gun-cotton charges, to be thrown by hand into boats when these engage each other, the fuse being fired from the attacking boat by means of a small pistol, into the barrel of which the extremity is inserted.

JAMES NASMYTH'S GEOLOGICAL VIEWS.

The following abstract from Mr. James Nasmyth's autobiography are of interest as showing what peculiar views that great engineer, whose judgment was so sound in mechanical matters, held on geology. In speaking of an ascent to Vesuvius he says:

"During my visit, the mountain was in its normal state. I mounted the volcanic ashes with which it is strewn, and got to the top. There I could look down into the pit from which the clouds of steam are vomited forth. I went down to the very edge of the crater, stood close to its mouth, and watched the intermittent uprushing of the blasts of vapor and sulphureous gases. To keep clear of these, I stood to the windward side, and was thus out of harm's way.

"What struck me most was the wonderfully brilliant colors of the rugged lava rocks forming the precipitous cliffs of the interior walls of the crater. These brilliant colors were the result of the sublimation and condensation on their surfaces of the combinations of sulphur and chloride of iron, quite as bright as if they had been painted with bright red, chrome, and all the most brilliant of tints. Columns of all manner of chemical vapors ascended from the clefts and deep cracks, at the bottom of which I clearly saw the bright, hot lava.

"I rolled as big a mass of cool lava as I could to the edge of the crater, and heaved it down; but I heard no sound. Doubtless the depth was vast, or it might probably have fallen into the molten lava, and thus made no noise. On leaving this horrible pit-edge, I tied the card of the Bridgewater Foundry to a bit of lava and threw it in, as a token of respectful civility to Vulcan, the head of our craft.

"I had considerably more difficulty in clambering up to the top edge of the crater than I had in coming down; once or twice, indeed, I was half choked by the swirls of sulphureous and muriatic acid vapor that environed me before I could reach the upper edge. I sat down in a nook, although it was a very hot one, and made a sketch of two of the appearances of the crater, which may, perhaps, interest my readers. But I feel that it is quite beyond my power, either by pen or pencil, to convey an idea of the weird, unearthly aspect which the funnel-shaped crater of Vesuvius presented at that time. An eruption of unusual violence had occurred shortly before I saw it. Great rounded blocks of lava had been thrown high into the air again and again, and had fallen back into the terrible focus of volcanic violence. Vast portions of the rugged and precipitous sides of the crater had fallen in, and were left in a state of the wildest confusion. When I visited the place, the eruption had comparatively subsided. The throat of the crater was a rugged opening of more than forty feet diameter, leading down to—where? Echo answers, Where?

"And yet there is no doubt but that the great mass of materials which lay around me, as I made my sketch, had been shot up from inconceivable depths beneath the solid crust of the earth. There still remains an enormous mass of molten materials that has been shut up beneath the crust since the surface of the globe assumed its present condition. The mineral matter had converged toward its center of gravity, and the arrestment of the momentum of the coalescing particles resulted in intense heat and the molten lava of the volcano.

"This seems to me to be the true origin of volcanic heat. It has played a great part in the physical history of the globe. Volcanic action has been, as it were, the universal plow; it has given us mountains, hills, and valleys; it has given us picturesque scenery, gorges, precipices, water-falls. The upheaving agent has displayed the mineral treasures

of the earth, and enabled man, by intelligent industry, to use them as mines of material blessings. This is, indeed, a great and sublime subject."

In another part of his work, we find the following somewhat glowing account of the greatest Swedish iron mine:

"My visit to the Dannemora mine, at Osterby, was one of peculiar interest. I may, in the first place, say that the immense collection of iron at that point has been the result of the upheaval of a vast volume of molten igneous ore, which has been injected into the rock, or deposited in masses under the crust of the earth. In some cases, the quarried rock yields from fifty to seventy and even as much as ninety per cent of iron. The Dannemora mine is a vast quarry, open to the sky. When you come near it, the place looks like a deep pit with an unfathomable bottom. Ghost-like, weird-looking pinnacles of rock stand out from its profound depths, but beyond these you see nothing but wreaths of smoke curling up from below. The tortuous chasm in the earth caused by the quarries beneath is about half a mile long and about a thousand feet wide.

"The first process of the workmen in the quarries below is devoted to breaking into small fragments the great masses of ore scattered about after the previous night's explosions. These are sent to the surface in great tubs, attached to wire ropes, which are drawn up by gins worked by horses. Other miners are engaged in boring blast-holes in the ore, which displays itself in great wide veins in the granite sides of the vast chasm. These blast-holes are charged with gunpowder, each with a match attached. At the end of the day, the greater number of the miners are drawn up in the cages or tubs, while a few are left below to light the slow-burning matches attached to about a hundred charged bore-holes. The rest of the miners are drawn up, and then begins the tremendous bombardment. I watched the progress of it from a stage projecting over the wild-looking, yawning gulf. It was grand to hear the successions of explosions that filled the bottom of the mine far beneath me; then the volumes of smoke, through the surface of which masses of rock were sometimes sent whirling up into the clear blue sky and fell back again into the pit below. Such an infernal cannonade I have never witnessed. In some respects it reminded me of the crater Vesuvius, from which such dense clouds of steam and smoke and fire are thrown up. In the course of the night, the suffocating smoke and sulphureous gases had time to pass away, and next morning the workmen were ready to begin their operations as before."

THE INTRODUCTION OF IRRIGATION INTO NEW COUNTRIES, AS ILLUSTRATED IN NORTHEASTERN COLORADO.

At the meeting of the British Institute of Civil Engineers, a paper was read on the Introduction of Irrigation into New Countries, as Illustrated in Northeastern Colorado, by Mr. P. O'Meara, the object of which was stated to be three-fold: First, to give an account of the development of irrigation in Northeastern Colorado; secondly, to inquire into the principles which should guide the introduction of irrigation into new countries; and thirdly, to examine how far the methods pursued in Northeastern Colorado were in accord with them. The *Engineer* gives the following report of the paper in question: The development alluded to was influenced by most of the defects manifested in older countries, such as inaccurate measurement of water, growth of ill-defined rights, excessive waste water, etc., but there was a prospect of improvement through better legislation. The climate of Colorado was described as such that agriculture was all but impossible without irrigation. Both were begun in 1860. There were 155,000 acres under cultivation in 1880, and it was estimated that in 1883 there would be 465,000 acres, with prospects of still further development. The amount of irrigation possible would be limited by the quantity of water obtainable, and by the area which each unit of it could be made to irrigate. It would amount to 9,750,000 acres under an hypothetical water duty of twelve inches in depth for one season.

It was laid down that the duty of water in irrigation must vary with (1) the character and condition of the soil; (2) the rain-fall, temperature, and evaporation; (3) the method of application; (4) the kind of crop; and, in some cases, (5) the depth of the water-line below the surface of the ground. As regards (1) the influence of different soils, this must affect the duty of water, because on the nature of the soil depended the quantity of water it should absorb, and the rate of filtration and of evaporation from within it. The author gave details of experiments made by him to ascertain the amounts of water, and the times required to moisten two different typical soils in the Cache La Poudre Valley, and he drew some inferences from them. The formation of swampy lands and the prevalence of rust in wheat on some of the older farms were held to indicate that the quantity of water required for beneficial irrigation became gradually less year by year for a few years after the commencement. (2) The rain-fall of the season should be added to the artificial irrigation, and account should be taken of the surplus water not absorbed by the soil, otherwise all estimates of water duty must be misleading. The use of ordinary statistics of temperature and evaporation was at present vague and unsatisfactory, owing to the absence of experiments on the drying of soils. Nevertheless, the question of evaporation was so important that it was doubtful if any loss of irrigating power occurred in Colorado other than that which was due to it. (3) Irrigation methods were conducted on two antagonistic principles, namely, to increase to the most profitable extent, in the one case, the quantity of water supplied to a given area, and in the other the area irrigated by a given volume of water. The "Marcite" cultivation of Italy and the "asbestine sub-irrigation method" of California were cited as instances of these. Methods of irrigation were classed under four heads: by sprinkling, by flooding, by distributing through furrows, and by distributing through pipes or drains underground. Sprinkling had been tried in Scotland on seven acres of land by the Duke of Sutherland. The methods of flooding with compartments and of distributing through furrows were described in detail, as also the method of flooding without compartments, as practiced in Colorado. This was characterized as extremely wasteful. It was shown from the experiments on dry soil, before alluded to, that 6 inches or 8 inches in depth, instead of 42·84 inches, as at present extended, ought to suffice for cereals in Colorado. The experience of Professor Blount, of the State Agricultural College, was quoted to show that excellent crops of wheat could be grown with a rain-fall of 4½ inches only without irrigation. As regards (4) the water duty for different crops, it was the degree of moisture required in the soil around its roots, and not the absolute quantity which the plant itself absorbed, that had to be considered. The author furnished, in a tabular form, a list of statistics, derived from various sources, in which he had endeavored to include the essential elements. He considered it, however, to be nothing more than an approximation, because of the incompleteness of almost every statement of the kind. In the column of "totals," the limits of water duty appeared much narrower, because of the rain-fall being added to the irrigation depth, than they would be otherwise. Countries where good crops were grown without irrigation were included in the table, being considered to furnish a "natural duty of water," which should be useful for comparison with water duties in places where irrigation was practiced. Some remarks followed with respect to the peculiarities of certain crops, namely, rice, alfalfa, sugar-cane, summer meadows, potatoes, cereals, and tea. The author then discussed the sources and works of supply, and the legislation of irrigation. The sources were stated to be two, namely, springs and rivers. The supplies were made available for direct irrigation by canals, and for indirect irrigation, after storage, by reservoirs. The works of the North Poudre Irrigation Canal, of a capacity of about 300 cubic feet per second, which had been carried out under the author's charge, were described. Those most worthy of remark were a crib-dam, 30 feet 6 inches high, some shelf-work, tunnels, and "gulch" bridges. Details were also given of a larger canal, the Northern Colorado. These works show a considerable departure from the practice of older countries, owing to the abundance of timber and to the preference of Americans for economy and rapidity in construction over durability. The principal supplies of water in Colorado came from the snows of the Rocky Mountains. The rivers rose, reached their maximum, and fell again, frequently before the end of the irrigation season. Hence measurements of the snow remaining on the mountains were of importance to agriculturists. The construction of reservoirs was dealt with as a means of reducing risk in cultivation in countries where the rivers failed in the crop season. Reservoirs were distinguished as of three kinds: "River-bed" reservoirs for equalizing the flow; "main" reservoirs, which received the entire volume of a canal; and "detached" reservoirs, which received a portion only. A serious error in the construction of some reservoirs in Colorado was pointed out. The gauge first used for measuring water in Colorado was the Max Clark's gauge, and the improved system at present in use, with the formula of Francis: $Q = 3{\cdot}33\,(l - 0{\cdot}1\,n\,h)\,h^{\frac{3}{2}}$, were described and commented on. A short account of the legislation affecting irrigation in Colorado followed. The legal definition of an "inch of water" was given in full. Those laws were such that any holder of land in the State was entitled to take and use the waters of the rivers, and any one could construct reservoirs and store unappropriated water. A fruitful crop of litigation had, as a matter of course, been developed in the State; and some cases were still pending. A series of laws was passed in 1879 to determine the order and priority of existing and future claims, to fix the price of water, and to control its distribution. The author finally directed attention to the report of the State Engineer of California on similar laws, concurring generally with the principles advocated therein, and suggesting a free exchange of water rights, and the condemnation of such reservoir sites as were used for direct irrigation only.

THE EFFECT OF REPEATED HEATING ON STEEL AND IRON.

Mr. J. F. Barnaby has lately presented to the Controller of the British Navy a report giving the results of a series of experiments which he made at the Cyclops Works, Sheffield, to ascertain the effect of repeated heating and cooling on the strength of different makes of iron and steel. The metals submitted to trial were Siemens or open-hearth steel, and Bessemer steel, of about the maximum and minimum strengths allowed by conditions of contract, and Bowling iron and iron of B. B. quality, as made by Messrs. Cammell & Co. for use in her majesty's service. In making the tests, it was endeavored to subject the several samples, as far as possible, to treatment similar to that which they would receive if forming portions of a boiler in actual use. Herewith we give a table showing the average results of the tests of the higher strain Siemens and Bessemer plates, and of the B. B. iron plate:

Treatment of Sample.	Siemens or open-hearth steel.		Bessemer steel, ⅝ boiler plate.		C. Cammell & Co.—B. B. boiler.		Bowling iron.	
	Tensile strain per square inch in tons.	Percentage of elongation in 8 inches.	Tensile strain per square inch in tons.	Percentage of elongation in 8 inches.	Tensile strain per square inch in tons.	Percentage of elongation in 8 inches.	Tensile strain per square inch in tons.	Percentage of elongation in 8 inches.
Normal condition.....	31·115	24·60	31·26	19·14	22·66	7·41	21·08	13·67
Sample heated 3 times ...	30·080	26·56	33·15	21·48	.....	.....	20·28	14·64
" 8 times....	30·580	25·97	32·70	22·06	20·56	7·22	20·36	15·71
" 12 times...	30·620	25·38	33·10	22·06	21·51	9·17	20·64	17·96
" 20 times....	30·750	24·99	32·43	22·45	20·15	7·81	20·02	16·79
" 40 times....	30·750	25·97	32·80	22·45	20·75	8·28	20·70	18·54
" 60 times....	31·440	26·75	32·63	23·25	20·83	8·60	20·35	16·40
Sample placed in the flue of a stationary boiler 16 days	30·770	26·55	28·64	20·11	21·68	7·22	20·20	14·65
Sample placed in smoke-box of a locomotive 16 days...	30·010	26·16	31·09	24·60	20·97	8·17	20.50	13·28
Samples placed in annealing furnace 16 days.....	26·100	28·51	28·25	24·61	15·27	5·85	15·24	11·32

Each result is the average of four tests, two lengthwise of the plate and two across it, except those of the first horizontal line, which are deduced from two experiments only. These show the normal tensile strengths and percentages of elongation of the several plates, each five eighths thick, from which the samples were cut. In the second to the seventh lines inclusive, are shown the strengths per square inch and the elongations obtained after the samples had been heated in a furnace arranged similarly to an oven, so that the heat should be uniform. They

were exposed until they attained a heat of about 800 degrees Fahr., which was ascertained by withdrawing them and noting if small pieces of zinc would melt if placed upon them. They were then allowed to cool and the process repeated 3, 8, 12, 20, 40, and 60 times, as recorded in the table. The samples from which the tests shown in the eighth line were obtained were placed in the flue of a stationary boiler for sixteen days, care being taken to keep them clear of ashes, so that they received the heat from the boiler on their under sides, while their upper surfaces were exposed to the heat radiating through the fire-bars from the fire. Mr. Barnaby considers that the heat of these samples was often up to 800 degrees, and at other times was very much below that point. The determinations shown in the ninth line were obtained from samples suspended for sixteen days from a bar fitted in the smoke-box of a colliery locomotive. As the engine was subject to considerable variations of work, and was idle at night, the samples would be alternately heated and cooled. Experiments with various alloys showed the maximum temperature to be about 800 degrees Fahr. The last line gives the results of tests made on samples which had been placed under the bridge of an annealing furnace in such a position that the flames could not impinge upon them. They were kept in this situation for sixteen days, the furnace being allowed to cool down each evening, and being got up to the required heat again next morning, so that the samples were exposed to a black heat at night, and during the day time to a red heat, sufficient in the sixteen days to scale them to the extent of one eighth inch.

The results of the tests showed that Siemens steel retains all its good qualities, except after the very severe treatment of being subjected to long and continued red heat; that Bessemer steel suffers no deterioration except a slight falling off in its flexibility; that, even after being heated and cooled sixty times, it has only slightly increased in tensile strength, while it has maintained its percentage of elongation; and that, after the samples had been subjected to the continued red heat, the results obtained were most satisfactory, and greatly superior to those of iron; that the irons only deteriorated under a continuous red heat, under which circumstances they suffer much more than the steel.

After the samples had been broken in the testing-machine, they were bent by a hammer over a bending-block as far as they could go, and illustrations are appended to the report showing how far the process was carried before cracks were developed. As might be expected, the results were very uncertain; but on the whole, the Siemens steel came the best through the trial, after bending into horseshoe shape without the development of a flaw. The preliminary stretching appeared to have completely destroyed the flexibility of the iron, which cracked upon the slightest curvature.

THE RIO TINTO COMPANY.

The report of the directors, prepared for presentation at the forthcoming meeting, states that, unlike the accounts of the two previous years, those now submitted show no change in the capital account, except in respect to the 5 per cent bonds of 1880, which are further reduced by £33,220, the amount of the year's drawings. This amount has, as usual, been charged to the revenue account, and written off the cost of mines, which is thus reduced to £3,572,460. The profit on sales of produce and other items at the credit of revenue account, including £10,456 2s., brought down from the previous year, amount to £748,764 3s. 7d. After providing for all interest and expenses of administration, and the £33,220 amount of drawn bonds, there remains a net profit available for dividend of £477,183 16s. 4d., which the directors propose to appropriate thus: Interim dividend of 12s. per share, paid November, 1882, on 325,000 shares, £195,000; dividend now recommended to be paid, 16s. per share on 325,000 shares, £260,000, making together 28s. per share, or 14 per cent per annum = £445,000, and leaving a balance of £22,183 16s. 4d. to be carried forward in revenue account.

For the development of the property, 556,610 cubic meters of overburden on the south lode have been removed during 1882. Balance at debit of overburden account at end of 1882 was £196,624 7s. 9d. In both the San Dionisio and the North lode, the quantity of ore already laid open and prepared is such that the output can at any time be largely augmented. The tunnel to connect the north with the south lode is also steadily driven with the same object in view. The large masses of ore made available by the works already carried out will render any further heavy outlay unnecessary, whether on account of overburden of extensions and development-works, or of buildings, machinery, etc., and the charge which is regularly made upon the ore as extracted will steadily reduce the balance of overburden and of extension and development-works until they are finally liquidated.

The quantities of pyrites extracted were, in tons: In 1880, for shipment, 277,590; for extraction of copper by local treatment, 637,567= 915,157. In 1881, for shipment, 249,098; for extraction of copper by local treatment, 743,949=993,047. In 1882, for shipment, 259,924; for extraction of copper by local treatment, 688,307=948,231. The quality of the mineral is well maintained, and its average copper contents over the entire quantity have been 2·805 against 2·75 per cent for the previous year. The amount of the company's pyrites actually consumed in England, Germany, etc., during the year has been 272,826 tons, against 256,821 in 1881, and 274,201 in 1880. The copper produced during the year by treatment at the mines was estimated at 10,822 tons of 1000 kilos., and there were brought to market and realized 9651 tons of 21 cwts., leaving the balance to be carried forward to the current year at cost price. The comparatively small increase of production this year is entirely due to the exceptionally dry season, and, owing to the unprecedented scarcity of water, the expensive pumping back of used liquors has added to the cost of the copper to the extent of about 10 per cent. As regards water supply, it was reported last year that means had already been adopted to construct a large reservoir to contain about 2,500,000 tons of water. This reservoir is now nearly finished, and as rain began to fall in January of this year, it contains about two fifths of its full capacity—over 1,000,000 tons—available for 1883, besides the ordinary storage of water in the previously erected reservoirs of about the same quantity, which are now full. The railroad and pier have been maintained in good order, and are in full operation. All repairs and cost of maintenance have been charged to revenue.

THE VENTILATION OF COAL CARGOES.

Messrs. William Lindsay & Co., of Greenock, have addressed the following letter to the British Board of Trade:

"The question of spontaneous combustion of coal cargoes on long voyages is of such vital importance to ship-owners and underwriters, and has received so much attention from your board, that the following information, which we have to-day received from the captain of our bark Inchgreen, concerning his experience on a voyage from Dundee to San Francisco with a coal cargo, is our excuse for troubling you with a long letter. The Inchgreen sailed from Dundee on the evening of the 22d April, 1881, with 1509 tons of Watson's splint coal on board for cargo. These were shipped during fine weather, and, so far as we can remember, were perfectly dry when being loaded. The vessel has got two decks, between decks being laid, with the exception of a middle space of three feet, running right fore and aft, for which there are hatches, but with coal cargoes these are not put on. With this particular cargo, the coals were about two feet from the main deck from the after-hatch to the fore-hatch, sloping down at both ends, leaving a free space of about forty feet aft, and about the same forward on the between decks. The ship is very well ventilated, having two bell-mouth ventilators on the forecastle, the forward one 7 inches diameter at deck and 14 inches at bell-mouth, the after 9½ inches diameter at deck and 16½ inches at bell-mouth, ventilating both lower holds and between decks; a ventilator of 11 feet by 9 inches through the house on deck between the fore and main hatches for the between decks only; another, 3 feet square, ventilating lower holds and between decks abaft the mainmast; another, 2½ feet square, ventilating between decks about twelve feet from the after collision bulkhead. With ordinary cargoes, such as sugar, etc., the forward and after ventilators alone are used, and so well has the ventilation been arranged that, with a cargo of low Manila sugar, it was impossible to detect that there was sugar on board from the smell on the vessel's arrival in London; and at present, with a cargo of Java sugar, there is not the slightest appearance of sweat or discoloration on any of the baskets so far as can be seen, thus showing the thorough efficiency of the ventilation. On the 12th of May, after being three weeks out from Dundee, in latitude 36° 14′ N., longitude 19° W., Captain Miller discovered that the coals were heating, and that there was a dense vapor rising from them, which the ventilation then in use did not seem capable of carrying off. He caused a passage to be dug from the main hatch forward, and, with the view of improving the ventilation, cut a circular opening in one of the fore-hatches, into which he shifted one of the forward ventilators, erecting a small windmill at its mouth, he believing this would draw off the vapor and heated gases much more rapidly than by the ordinary action of the ventilators. The coals at this time had become so heated that it was almost impossible to stand on them, and Captain Miller was very apprehensive of the safety of his ship. Soon after the application of the windmill, an improvement was observed, which daily continued, until at the end of three weeks there was no sign of heat in the holds, the coals continuing cool until the termination of the voyage at San Francisco on the 2d of October, one hundred and sixty-two days from Dundee. At that particular time, nearly all the ships sailing from Dundee and arriving at San Francisco were more or less affected by fire in their cargoes. So far as we at present know, the Dunottar Castle, Caitlock, and Traveler had their cargoes on fire, and the British Sovereign, which succeeded the Inchgreen at the coal-crane, has never been heard of. We think it probable that the Inchgreen's immunity from fire is owing to the simple contrivance arranged by Captain Miller, and we bring the matter before you with the desire of its being made known to ship-owners and ship-masters loading similar cargoes.

THE CONDITION IN WHICH CARBON EXISTS IN STEEL.

Two series of experiments have been made recently by Sir F. A. Abel and W. H. Deering, the results of which have just been published. In the first series, disks of steel 2·5 inches in diameter and 0·01 inch thick were employed. They were all cut from the same strip of metal, but some were "cold-rolled," some "annealed," and some "hardened." The total carbon was found to be, "cold-rolled," 1·108 per cent; hardened, 1·128 per cent; and annealed, 0·924 and 0·860 per cent. Some of the disks were submitted to the action of an oxidizing solution consisting of a cold saturated solution of potassium bichromate with 5 per cent by volume of pure concentrated sulphuric acid. In all cases, a blackish magnetic residue was left undissolved. These residues, calculated upon 100 parts of the disks employed, had the following compositions: "Cold-rolled" carbon, 1·039 per cent; iron, 5·871. Annealed, carbon, 0·83 per cent; iron, 4·74 per cent. Hardened, carbon, 0·178 per cent; iron, 0·70 per cent. So that by treatment with chromic acid in the cold, nearly the whole of the carbon remains undissolved with the cold-rolled and annealed disks, but only about one sixth of the total carbon is left undissolved in the case of the hardened disk. The authors then give a *résumé* of previous work on the subject. In the second part, they have investigated the action of bichromate solutions of various strengths on thin sheet-steel, about 0·008 inch thick, which was cold-rolled, and contained—Carbon, 1·144 per cent; silica, 0·166 per cent; manganese, 0·104 per cent. Four solutions were used The first contained about 10 per cent of bichromate, and 9 per cent of sulphuric acid by weight; the second was eight tenths as strong, the third about half as strong, the fourth about one and a half times as strong. In all cases, the amount of solution employed was considerably in excess of the amount required to dissolve the steel used. A residue was obtained as before. With solution 1, the residue contained, carbon, 1·021; solution 2, carbon, 0·969; solution 3, carbon, 1·049 (the atomic ratio of iron to carbon was iron, 2·694 : carbon, 1; iron, 2·65 : carbon, 1; iron, 2·867 : carbon 1); solution 4, carbon, 0·266 per 100 of steel. The authors conclude that the carbon in cold-rolled steel exists not simply diffused mechanically through the mass of steel, but in the form of an iron carbide, Fe_3C, a definite product, capable of resisting the action of an oxidizing solution (if the latter is not too strong), which exerts a rapid solvent action upon the iron through which the carbide is distributed.

THE HENDERSON GAS-FURNACE.

After years of study, Mr. James Henderson has designed a gas-furnace for metallurgical purposes which combines a number of details looking toward as complete a utilization of the fuel as possible, together with the rapid generation of the highest heats practically required. The principle which appears to have guided him is, that the supply of air for the generation of the gas in the producer and the quantity needed for its combustion—partial or complete as the requirements of the process may be—can only be supplied with the needed accuracy by separate engines.

In the plan of the drawing which we give this week, the air for converting the fuel in the producer *A* into gas is furnished by an engine—a vertical fly-wheel engine in this case—with a steam cylinder *s*, and an air cylinder *N*. In order to make the flow of air more regular, a receiver *P* is provided, from which it is carried to the blast-pipe of the producer, being distributed into the furnace by the tuyeres *i*. The coal is charged into the safety-hopper *a*, and falls into the upper part of the producer *r'*, provided with a boiler-iron skirt, serving as a retort in which the bituminous substances of the coal are partly distilled off and forced to pass downward into the current of gas. The aim of Mr. Henderson is to produce a gas containing one third by volume of hydrogen, and two thirds by volume of carbonic oxide, and he introduces steam whenever it is necessary to effect that end. Mr. Henderson has adopted the plan of removing the ash and clinker in the coal by fluxing it and tapping the cinder through *d*, the fluxes being so chosen that the cinder carries three parts of silica to two parts of lime and one part of alumina; and to effect this, varying quantities of lime are generally added. We are informed that this plan has worked very well at the experimental plant put up at Bellefonte, Pa. It will be noticed that, in accordance with modern practice, Mr. Henderson places his producer in close proximity to his furnace, thus avoiding any loss of heat by radiation in long flues. Flowing through the flue *B*, the gas passes downward at its end and mixes thoroughly with the preheated air, discharged, through the pipe *T*, through a large number of small holes in a direction at right angles to the direction of the current of gas. Thus thoroughly mixed, the burning gases enter the reverberatory chamber *C*, impinging upon the metal in the hearth *V*. The air for the combustion of the gas is furnished in the exact quantity needed by the blowing-engine *I J*. It passes through the regulating receiver *K*, the pipe *L*, into the hot-blast pipes *S*, placed under the boiler *O*, where the waste heat of the gases of combustion is utilized. To prevent radiation of heat, the blast-pipe *T*, conveying it to the point where it is to be burned, is well covered with non-conducting material, and an expansion-joint is also provided. The melter has it in his power to obtain a neutral, oxidizing, or reducing flame by regulating the quantity of air to be mixed with the gas. In the case of the two former methods of working, the gases of combustion leave the reverberatory chamber *C* through the flue *D*, and this heat is first utilized to preheat materials to be melted on the hearth *E*. The heat of the waste gases is further reduced by heating the air in the pipes *S*, and making steam in the boiler *O*. In case a reducing flame is required in the reverberatory chamber, the combustion of the gas has been only partial. In order to fully utilize it, Mr. Henderson diverts the excess of air for combustion not passed through *T*, into the pipe *c''* under the hearth of the preheating chamber *E*, carrying it upward in flues along the free side-wall of the hearth, to be further heated, and making it flow through the slanting holes in the roof at the end of the flue *D* into the current of unconsumed gases coming from the reverberatory chamber *C*.

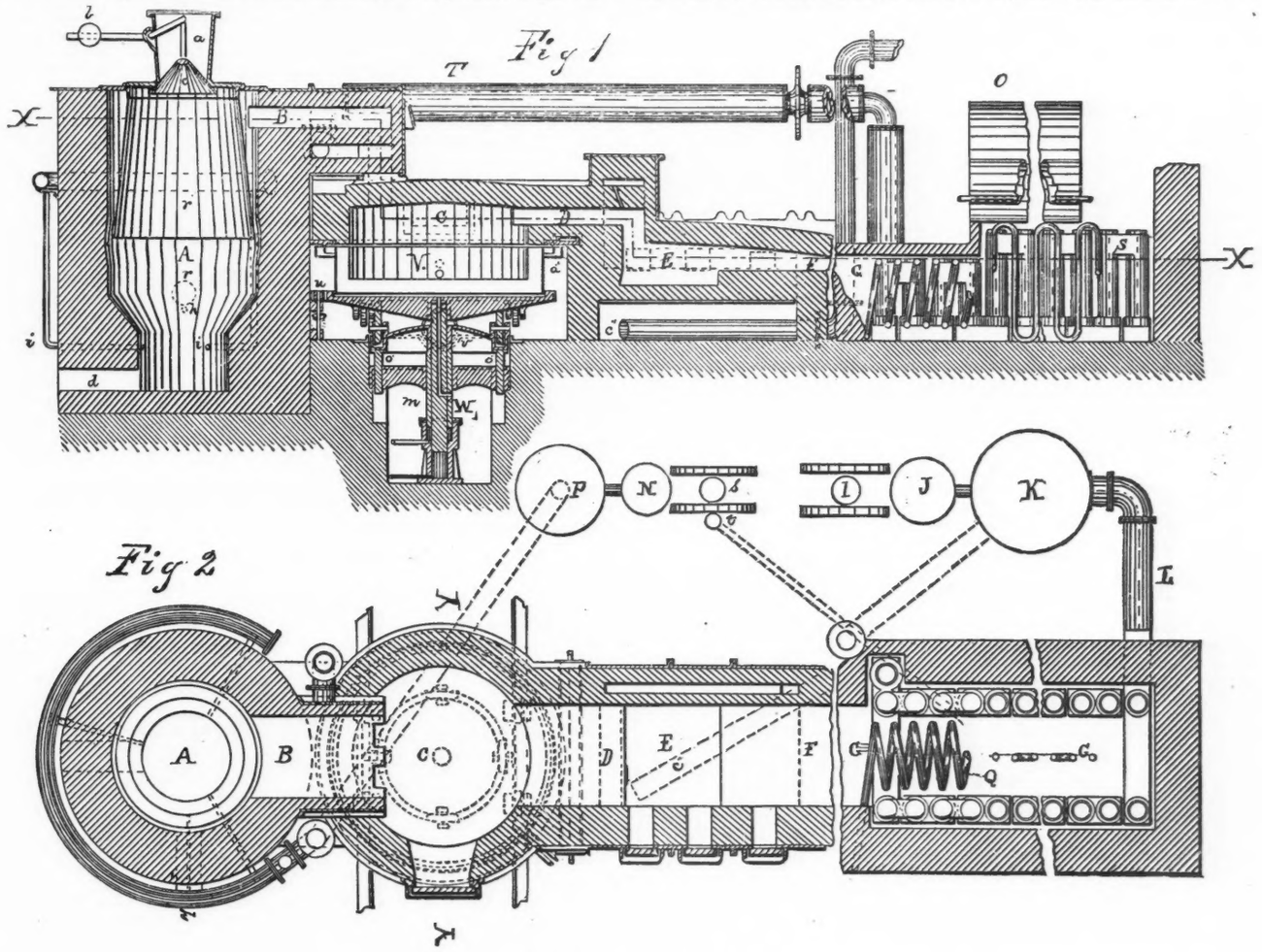
The hearth itself is mounted on a rotary platform which can be raised into position by hydraulic power. A sand-box is used for sealing the joint. The hearth makes from 3 to 4 revolutions per minute. By lowering the platform, two wheels, with which it is provided, rest on a track over which it can be drawn out sideways.

The furnace we have described has been experimented with at Bellefonte, the capacity of the hearth being 2½ tons. It was principally built to test its performance compared with the Siemens regenerative furnace, the lack of proper handling appliances making it impossible to enter into any regular work in melting and casting steel. The furnace, of course, is capable of being enlarged to the dimensions given to modern open-hearth furnaces.

Mr. Jonathan Jinks, steel-melter of the St. Albans Steel-Works, St. Albans, Vt., gives the following record of an operation of the Henderson direct-acting furnace:

MAY 1ST,	1 P.M.	—Furnace lighted, using one sixth of a cord of wood.
	4 P.M.	—Blast put on. The furnace was heated with coke for 12 hours during the night, to keep the producer hot and enable the men to rest.
MAY 2D,	4 A.M.	—Furnace charged with gas-coal.
	8 A.M.	—Furnace hot.
	12 M.	—Began making bottom.
	12 P.M.	—Bottom made. Furnace idle 4½ hours.
MAY 3D,	4.30 A.M.	—Charged metal.
	9 A.M.	—Tapped out the heat.

This makes a total of 44 hours, from which 16 hours must be deducted, leaving the actual working 28 hours. Comparing this with the Siemens furnace, we have: The latter requires one day's heating with wood fire at



the start, with a consumption of from 3 to 4 cords of wood. It takes 48 hours before it is hot with gas and from 2 to 3 days more to make a sand bottom. Working a charge of half pig and half scrap-iron is completed in from 11 to 12 hours, to produce as low a carbon steel as that made with the Henderson furnace. In the latter, the charge referred to was: 1000 pounds No. 2 Bessemer pig, 600 pounds of steel scrap from the former heat, 300 pounds of wrought scrap, 30 pounds of ferro-manganese, and 220 pounds of Lake Superior iron ore. Mr. Jinks estimates the waste at 6 per cent. It is claimed that the repairs to the Henderson furnace will not be more than those of an ordinary puddling-furnace, the principal parts, the inlet and outlet of the flue, being readily accessible. Mr. Henderson's furnace, which has been patented, is certainly well designed, and the fuel consumption, as shown thus far, 3 cwts. per hour for the 2½-ton furnace, is low.

THE SIEMENS REGENERATIVE FURNACE PATENT.

Judge Butler, in the United States Court in Philadelphia, has filed an important opinion, in which he dismissed a bill in equity of Charles M. and Frederick Siemens against the directors of the Midvale Steel Company, claiming a royalty upon the use of the Siemens regenerative gas-furnace from 1878 to 1881. The Midvale Company contended that the patent expired in 1878, and refused to pay any penalties after that date. The patentees claim that their rights did not expire until 1881, and demanded a royalty for the three years. A number of manufacturers paid the royalty. The Midvale Company contended that the furnace having been patented in England in 1861, the English patent limited the duration of the American patent under an act of 1839, as amended by an act of 1861, to seventeen years, to July 22d, 1878. The complainants contended that their patent, which was of March 1st, 1864, and on its face was for seventeen years from that date, was not limited by the English patent, because the improvements patented here were substantially different from those described and shown in the English patent, and because, even if it were otherwise, the act of 1861 gave all patents thereafter issued a term of seventeen years from their date of issue. The American patent, it was consequently contended, did not expire until March 1st, 1881. Judge Butler, in the course of his opinion, said: "The language of the act of 1861, that all patents hereafter granted shall remain in force for seventeen years from the date of issue, considered in connection with former and existing legislation respecting inventions first patented abroad, was well calculated to create the doubt and embarrassment which have followed. In the absence of decisions by other courts, I believe I would have reached the conclusion that the language first quoted was intended simply to increase the duration of all patents thereafter issued equally, giving to each an additional period of three years without interfering with the distinction so long maintained between inventions originally patented here and those patented abroad. The question, however, having been fully considered by Judge Blatchford in a case requiring his decision, I am content to adopt his views. The reasons on which he rests his conclusions commend themselves to my judgment."

SAMPLING AND ANALYZING ORES AND CHEMICAL PRODUCTS.

Prof. George Lunge, of the Zurich Polytechnic School, has sent out the following letter, the contents of which, though applying more directly to the chemical industries, touch questions which have long agitated those engaged in various branches of mining and metallurgy:

The committee of the German Society for the Promotion of Chemical Industry has resolved, upon a suggestion made by the representative of the chemical manure manufacturers, to submit to the next general meeting of the society the following proposal, namely:

"That steps may be taken for bringing about an international agreement concerning uniform analytical methods for estimating the commercial value of certain products."

I have been honored with the request to lay a report upon this matter before the meeting, and for this purpose I take the liberty of addressing myself to you, to obtain the favor of your opinion thereon.

It will not be doubted that the confusion at present reigning in that matter is very awkward indeed. In the transactions between manufacturers and their buyers and sellers, unpleasant discussions or even lawsuits are frequently caused by the employment of different methods of sampling or testing, or both—methods which must needs lead to differing results; and an appeal to a commercial analyst sometimes increases the confusion by the introduction of a third method. This would be avoided if all those concerned were agreed upon employing certain standards for sampling and testing the goods, the same specific gravity tables, and so orth.

It is, moreover, most desirable that the results of analysis should be expressed in a uniform manner. Mutual understanding is greatly impeded if, for instance, one party calculates phosphoric acid as such, the second as tricalcic phosphate, the third perhaps as monocalcic phosphate. The strength of soda-ash is expressed in a different way each in England, France, and Germany, and many other similar instances might be quoted. Not merely for commercial purposes, but also for comparing results of work, it would be most desirable to establish some such agreement. An English acid-maker, who learns that his German neighbor consumes so much nitric acid at 36° Baumé for each cwt. of sulphuric acid, has no notion what that may mean in terms of 96 per cent nitrate of soda per 100 parts of sulphur, etc., etc.

A considerable number of the German chemical manufacturers has taken steps for improving this state of affairs, at least within their own country. The chemical manure makers have agreed upon uniform and binding modes of testing, and the alkali trade is aiming at the same object by means of a *Manual for Alkali, Potash, and Ammonia-Works*, just published. The success already attained in this direction in Germany has been an encouragement to conceive the idea that the great advantage of uniform methods might be extended internationally, and it is just the object of the present communication to gather information about the possibility of realizing this.

Nobody, of course, will overlook the difficulties standing in the way of such an agreement. Some of the countries concerned do not even possess suitably organized unions of chemical manufacturers, and international unions of such a character are altogether out of the question. Even if such existed, they would never succeed in *compelling* their members to employ certain methods, or even the same way of expressing the results, and still less would they be able to exert such a compulsion upon the buying and selling public and the commercial analysts. Nor can it be denied that great differences of opinion exist as to the value of many analytical methods, and that constantly new, if not always better, methods come to the fore. Hence a rigid compulsory code, binding forever, or even for a long period, is not to be thought of. But, on the other hand, those go too far who for this reason deny the possibility, or even the desirability, of an agreement in this respect. Even in public matters no law can be made which embodies absolute truth and justice; in the long run, with changing circumstances, the best laws become unsuitable, and must be changed; but nobody pretends that therefore we must do without laws altogether. Without laying too much stress upon this simile, it will be conceded that an agreement among the leading manufacturers and chemists of the great industrial countries upon the matters concerned, even though it would not either possess or claim absolute binding power, would be invested with sufficient authority to serve, in a large majority of cases, as a standard in the intercourse between buyers and sellers. It would soon become a regular practice to stipulate for those standards in contracts and sale notes, and they would be acknowledged as decisive in courts of law.

With this view, I beg to lay the following questions before you, in the respectful hope of receiving as full an answer as possible, to be made use of, either with mention of name or otherwise, as you may wish, in my report to the meeting of German chemical manufacturers:

1. Do you believe that an international agreement concerning exact standards of *sampling* ores, raw products, and chemicals could be attained?
2. Do you believe that a similar agreement could be attained in the matter of *analytic methods*, and more particularly in which definite branches of industry?
3. Do you believe that in some definite branches of chemical industry a uniform international *way of expressing the results* could be agreed upon, and have you any specific proposals to make in this respect?
4. In case you should answer one or more of the above questions in the affirmative, what *organs* would you think suitable for establishing an international agreement?
5. Do you think that such agreements should be made for an indefinite time, or that their *revision*, evidently called for from time to time, should be from the first provided for by a periodical action of the just-mentioned organs?
6. In what *form* do you think that the results of such an agreement should be made accessible to the public?

Whatever your opinion may be upon these points, I shall consider it a special favor if you will impart it to me at your convenience, in order to make use of it in my official report.

A ROAD OF SILVER.—The following tall story is going the rounds, and is gravely printed: In Clinton County, N. Y., Peter Trembly, of the Trembly Iron Company, in making roads, has been using cinders resulting from the ore passing through the heat of the forge. It has been noticed that a road covered with these cinders has been glittering. An investigation showed that a rich vein of silver had been struck in the iron mine, and the precious metal melting in the forge had run through upon the cinders that had been so freely distributed along the road. Mr. Trembly gathered up his cinders, deciding not to have a road of silver in this world.

FURNACE, MILL, AND FACTORY.

Mr. A. T. Chur, agent of the Abernant Dinas fire-brick and cement, has removed to the Mills Building, Room 14.

The Graydon & Denton Manufacturing Company has opened an office for the sale of its Dynamic rock-drill at No. 1 Park Place, in this city.

Dr. Edwin Fowler, President, and Professor Theodore Stahl, General Manager, of the Southern Colorado Bismuth and Silver Mining and Smelting Company, of Silverton, Colorado, have placed their order with the Fort Scott Foundry and Machine-Works for the erection of a concentrator at their mines, of sixty tons capacity per day.

The No. 1 stack of the Saucon Iron-Works, at Hellertown, Pa., has been blown out for repairs. It is likely the furnace will remain out of operation until there is a larger demand for iron, and a consequent increase in its value.

In going over a pamphlet issued by the John Ashcroft Manufacturing Company, of this city, we came across the following figures relating to competitive tests made with ordinary boiler furnaces and with furnaces provided with the Ashcroft furnace-door and grate-bars. At the Manchester Print-Works, an ordinary furnace, during a trial-run of thirty-six hours, consuming Lackawanna anthracite, the evaporation of water from 212 degrees Fahr. was 10·97 pounds per pound of coal, while with the same fuel and the same type of furnace, fitted with the appliances referred to, the evaporation was 11·90 pounds, a gain of 8·47 per cent, while the amount of clinker taken out was considerably less than in the first case. Another test, carried out at the works of the Troy Steam Heating Company, showed a gain of 5·52 per cent in efficiency.

Uniform steam pressure being a necessity in the production of a perfect electric light, the Edison Light Company, of New York, has secured it by the use of the Curtis pressure regulator. The company uses 5-inch regulators on its large engines.

P. J. Dalton, of Latrobe, Westmoreland County, Pa., has closed a contract for the building of twenty coke-ovens at Clarksburg, West Va. They are for the Despard Coal and Coke Company, of Baltimore.

The Crozer Steel-Works, at Roanoke, Va., are nearly ready for work.

The Sarven Wheel Works, at Indianapolis, will soon be completed. Messrs. Hadley & Wright are furnishing the boilers and engine and are now turning up the large belt-wheel, 14 feet in diameter and 24 inches face, said to be the largest wheel of the kind ever made in Indianapolis.

The Reading *Herald* says: The Harrisburg Nail-Works have been experimenting in the manufacture of nails from steel, and have succeeded in producing a fine article. The nails are manufactured from steel made at the Pennsylvania Steel-Works, the quality the same used in making rails; the nails are pronounced

to be superior in quality to the iron nail. They are nicely finished ; and drive into the hardest of wood without bending.

Shawnee furnace, No. 2, at Columbia, Pa., is about to be closed for the present, on account of the limited demand for iron. Work will be resumed on the revival of business. The employés will not be discharged, but will be engaged in making repairs about the furnace.

The project of building a steel plate mill at Wheeling, West Va., for the common use of the nail mills there, is said to have fallen through.

Every portion of the Allentown, Pa., Rolling-Mill Company's Works has been closed, and work has also been suspended at the fire-brick works of Messrs. Ritter & Saylor, in that city.

At the Wando Phosphate Works, Charleston, S. C., the centrifugal mill of the Lucop & Cook Pulverizer Company, size D, has been running with marked success for several months upon the Charleston River rock. The product obtained is one ton per hour of fine powder, more uniform than the ordinary buhr-stone yield, and commanding a ready sale in preference to it. Woodward & Thiers, the well-known brokerage firm of Philadelphia, Pa., recently ordered from the Wando Phosphate Company three thousand tons of the centrifugal mill product, which is supplied as rapidly as possible, the Wando Works having ordered two more D mills, in addition to the one already running. The Lucop & Cook Company is also building mills to fill orders from the Atlantic and Ashepoo companies of Charleston, the Bradley Fertilizer Company of Boston, and others ; and the general introduction of its mill in place of the present cumbrous and expensive methods of buhr-stone grinding seems probable, as the power required by its centrifugal mill does not exceed eight horse, and it is prepared to guarantee that the cost of wear and tear and replacement of working parts will not exceed eight cents per ton of material pulverized.

The Grace furnace, Marquette, is to be put in blast in the near future, by a stock company, of which Sturges, Kruse & Travers, Chicago, are the prime movers. It is said that the money sufficient to put the property in shape is now ready, and that the work of improvement will be commenced at once. This will be a benefit of some little value to the district.

The Lechner Machine Company, of Columbus, O., is building a coal elevator at Straitsville, for the Columbus & Hocking Coal and Iron Company.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

The following patents bear date May 15th, 1883 :

ARIZONA.

TUCSON DISTRICT.

Woronoco Mining Company, San Diego lode. Lemuel J. Webster, Rescue and Champion lodes. Ferre Mining Company, Bee lode. Peter Whitman *et al.*, Silver Queen lode.

CALIFORNIA.

LOS ANGELES DISTRICT.

Seth Marshall, Jr., Rio Vista and Painsville lodes.

MARYSVILLE DISTRICT.

H. F. L. Strover *et al.*, Goods Flat quartz mine. Eben McKenney, Mountain placer mine. Alure Kerrigan *et al.*, Eastern Star placer. Red Hill Hydraulic Mining and Water Company, placer, Butte County.

SACRAMENTO DISTRICT.

William Irelan, Sr., Yuba and Arabian quartz mines. Frederick Safried, Yuba Extension quartz mine. C. E. Purington *et al.*, Golden Gem placer, Placer County. Lorenzo Herrick *et al.*, placer, El Dorado County.

COLORADO.

CENTRAL CITY DISTRICT.

Albert Ford, F. W. Crain lode. William E. Martins *et al.*, Anna lode. Henry M. Teller, Copper Bottom lode. John A. Fish *et al.*, Alaska lode. W. W. Thompson *et al.*, Mineral Point lode. William M. Roworth, Gunnell lode. Jacob J. Elliott, Specie Payment Extension lode. Charles W. Pollard, Seminole and Christie lodes. M. S. Claypool, Hamilton lode and mill-site. Cornelia C. Munsen *et al.*, First National lode. American Consolidated Gold and Silver Mining Company, Ajax lode. Thomas Kennedy *et al.*, West Gregory lode. William H. Hampton, Jr., Seneca lode. Frank Kilbaum, St. Louis Extension lode.

DURANGO DISTRICT.

Paul D. Wallis, Seal lode. Cream City Mining Company, Seymour lode. George W. Miles *et al.*, Stephen B. and John B. lodes. John W. Bailey *et al.*, Columbia lode. H. B. Adsit *et al.*, Little Dora lode. Consolidated Rico Mining and Milling Company of Colorado, mill-site, Dolores County.

LAKE CITY DISTRICT.

William Story *et al.*, Flagstaff lode. Thomas C. Wilson, Ram's lode. Edward S. Douglass *et al.*, John Wesley lode. Germania Mining and Smelting Company, Silver King lode and mill-site.

LEADVILLE DISTRICT.

Alexander M. Cochran *et al.*, Cumberland lode. George H. Whitelaw, Senator and Wanderer lodes. Crown Prince Mining Company, Crown Prince lode. James Beattie *et al.*, Little Susie lode. D'Estaing S. Covert *et al.*, Phat Purse lode. Park Range Mining and Prospecting Company, Hidden Treasure, Pick, and Ætna lodes. Cadillac Consolidated Mining Company, Trainer, P. J. C., and Buffalo Girl lodes. Robert Crawford *et al.*, Andrew Jackson lode. Ira A. Cammeth *et al.*, Ridge No. 1 lode. Arthur Ingram *et al.*, Pilot lode. P. H. Tompkins, Dauntless lode. J. C. Taylor, Amboy lode. John F. Campion *et al.*, Clara Burbank lode. Bethnel M. Newcomb *et al.*, Mary B. lode.

PUEBLO DISTRICT.

Consolidated Mining Company of Seven Mines, Waverley lode.

DAKOTA.

DEADWOOD DISTRICT.

Avery D. Clark, Steward lode. George A. Springer, Gustin lode. Deadwood-Terra Mining Company, Justice No. 2 lode. Giant & Old Abe Mining Company, Old Abe lode.

IDAHO.

OXFORD DISTRICT.

Bay Horse Mining and Smelting Company, Sky Lark lode.

MONTANA.

HELENA DISTRICT.

John C. C. Thornton *et al.*, Caledonia lode. John F. Forbis *et al.*, Eveline lode. Harry Gassert *et al.*, Blue Bird, Burlington, and Mono No. 2 lodes. John Downs, Sister lode. David Morgan, Independence lode.

NEVADA.

CARSON CITY DISTRICT.

Manuel San Pedro *et al.*, Star of the West lode and mill-site.

EUREKA DISTRICT.

Madeline Goetz *et al.*, Pride of the West lode. Day Silver Mining Company, Jack Rabbit lode. J. W. M. Cardeza, Thompson lode, and a mill-site, Lincoln County.

UTAH.

SALT LAKE CITY DISTRICT.

Mineral Point Consolidated Mining and Milling Company, Baby mine. Frederick Auerbach, Protector lode. Joseph R. Walker, Williams lode. William Halter, coal. Edward H. Evans, coal. Charles H. Evans, coal.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

Experts for the Copper Queen and Copper Prince mines have arrived, and the case will come up in the District Court in a few days.

TOMBSTONE DISTRICT.

BONANZA.—The mine, it is stated, has been bonded to Chicago parties for $20,000.

GRAND CENTRAL.—The pumps have been stopped for the present, and will remain idle until the Contention pumps are ready for work, when both companies will resume sinking below the water-level. It is expected that the delay will not exceed sixty days.

OLD GUARD.—Work has been resumed, and ten tons of ore are extracted daily. The milling ore is sent to the Randolph mill, and the smelting ore to the San Diego smelter.

PROMPTER.—A rich body of ore has been struck in the No. 5 shaft. The entire face of the shaft is in bromide ore.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

There is nothing new to report from the mines in this district. The production and work of development continue as usual.

PLUMAS COUNTY—GREENVILLE DISTRICT.

ARCADIAN.—A clean-up was made at the mill, and the bullion obtained left a profit of one hundred per cent on the total expenses of the mine and mill during twenty-five days' run. In this are included wages, timbering, mine supplies, liberal estimate for wear and tear of machinery, and the cost of water-power. All the ore milled on this run was taken from the upper tunnel in the Sunset ledge ; the stope on this ledge is now open 125 feet, and the vein runs from five to eight feet wide. The ore is low grade, but is soft and easily worked. Twenty tons are produced daily. Six hundred feet distant from where the above ore was taken and at a farther depth of 200 feet, another pay-chimney is open on the same ledge. This mine has only lately been opened, but the prospect thus far gives warrant to the belief that it will turn out to be a valuable property.

GOLD STRIPE.—The agent of this company, who now has charge of its affairs at Greenville, says the *Bulletin*, expects to be able in a few days to make a proposition to parties who have claims against the property to offer fifty cents on the dollar, in liquidation of the same.

INDIAN VALLEY.—This mine is now at a greater depth than any other in the district ; the shaft is six hundred and five feet deep, the entire distance being sunk on the ledge, and from top to bottom the ledge is less than two feet out of perpendicular. The ore is low-grade, and, being so hard, is expensive to work ; a fair profit is made ; but to secure this, the closest attention and most careful management are necessary in both mine and mill. In the mill, nearly all the rock has to be put through a rock-breaker before going to the batteries. Every precaution is taken to save the gold, which is very fine and difficult to catch.

CANADA.

PROVINCE OF MANITOBA.

HAY ISLAND.—This company has perfected arrangements for the active prosecution of the development of its claim, which is a continuation of the now well-known Keewatin. The sinking of a shaft has begun.

KEEWATIN.—Work is progressing very satisfactorily. Good ore was struck in the shaft recently. Some of this ore will be crushed and concentrated and shipped East for treatment.

ISABELLA.—Operations are active, and negotiations for the purchase of machinery are pending.

LAKE WINNIPEG.—Cross-cutting has been commenced, and the ore shows up well. Operations on a working-shaft will begin shortly. It will be started about 100 feet north of the trial-shaft.

WINNIPEG CONSOLIDATED.—The bullion produced shows $25.83 per ton saved, and the tailings a value of $16.61 per ton, giving a total of $42.44.

There is considerable activity in the phosphate regions of Canada. On the disappearance of the snow, numerous prospectors took the field, and new developments and discoveries are chronicled every day. The Cobden District is exciting the greatest amount of attention. Pan analysis made by Messrs. Ledoux & Ricketts of apatite, taken from a property worked by Messrs. Benedict & Cole, of New York, showed 89 per cent bone phosphate.

THUNDER BAY DISTRICT.

In Thunder Bay District, North Shore, Lake Superior, operations are carried on to a considerable extent, and several new companies have been formed for the purpose of working recent discoveries made in the district. The Jack Fish Lake mine promises to be one of the leading gold and silver producers. Prospecting will be carried on this summer to a greater extent than ever before.

WINNEPEG.

The assays of ore from the Canada Gold Mining Company's claim at Lake of the Woods are reported at $30 of gold per ton. Work is vigorously pushed forward at this and the Winnepeg Consolidated Company's two mines, between which it is situated. Mining claims are rapidly picked up in this vicinity.

Mr. Dobie has bought the Pine Portage mine for a sum said to be near $100,000. He is also bound to erect a ten-stamp mill.

At the Keewatin mine, three shifts have been employed for some time back, and sinking is proceeding in a satisfactory manner. The vein has not increased materially in width, nor is it at all likely to increase much before the lake level is reached. The shaft is down over sixty feet.

At the George Heenan mine, Superintendent Nagle is pushing work rapidly but substantially forward. He has lately made some valuable discoveries on the property. Three new veins have been found, not the most valuable of which is the uncovering of the Frenchman lead near where the present shaft is located, and where it had been industriously sought for years, but had eluded search. From what has been discovered, astonishing developments may confidently be expected in the next few months.

Arrangements have been made for the development of the Minnesaubie vein, on the lake, the property of Messrs. Rideout and Gibbons. Two shafts are sinking, each to be 7 by 10, 25 feet deep. The contract price for sinking is $28 per foot.

Mr. William Young, Superintendent of the International Mining Company, says work is progressing favorably at the Maiden location, although but a small staff is operating at present. The shaft is down some 18 feet. As soon as navigation opens, a double shaft will be put on, and the Climax, another valuable property belonging to the same company, will be opened.

COLORADO.

The following companies have filed articles of incorporation :

Bridal Veil Mining Company. Capital stock, $2,500,000. Directors : M. D Monsor, William H. Durham, and Samuel H. Gregg. Operations, Colorado

Principal office, Crawfordsville, Ind. Brittle Silver Mining Company. Capital stock, $200,000 ; shares, $10 each. Directors : George McGinley, H. M. Trueheart, Louis Wilbur, J. J. Hunter, and John Summers. Operations, Colorado. Offices at Galveston, Texas, and Silver Cliff, Colo. Buckeye State Mining Company. Capital stock, $1,000,000. Directors : Judge C. M. Hughes, W. B. Simons, R. Jones, and D. J. Roap. Bullion Prince Mining and Smelting Company. Capital stock increased to $600,000, and name changed to the Bullion Prince Mining Company. Bunker Hill Gold and Silver Mining Company. Capital stock, $1,000,0 .0 ; shares, $10 each. Directors : E. H. O'Neall, W. T. Bensel, B. R. Russell, W. R. Risting, J. Q. W. Wilhite, T. H. B. McCain, and Charles A. Miller. Operations, Gunnison County, Colo. Principal office in said county, and branch office at Crawfordsville, Ind. Chicago & Kansas City Mining Company. Capital stock, $1,000,000 ; shares, $10 each. Directors : George W. Jones, W. Small, J. H. B. Beckford, F. Howard, and E. P. Hatch. Operations, Chaffee County, Colo. Office, Maysville, Colo. Clayton Mining Company. Capital stock, $500,000 ; shares, $10 each. Directors : Clayton French and David T. Burr, of Philadelphia, and Charles Buckland, of Montezuma, Colo. Operations, Summit County, Colo. Principal office, Montezuma, and branch office, Philadelphia, Pa. Columbus Mining Company. Capital stock, $3,000,000 ; shares, $10 each. Principal office, Columbus, Colo. Congress Copper Mining Company. Principal office, Silverton, Colo. Cosmos Mining Company. Capital stock, $3,000,000 ; shares, $10 each. Directors : Carl Wulsten, Edward Chiles, S. D. Hayward, and two others to be hereafter elected. Operations, Colorado. Principal office, Denver ; branch office, Rosita, Colo. Denver Gold Company, Limited. Capital stock, £60,000 ; 240,000 shares. Directors : Francis Frederick Powell, Charles Henry Dunhill, Alfred Marshall, and Jay and Philip Bennett Marshall. Operations, Gilpin County, Colo. Office, Nevada, Colo. Enterprise Mine Developing and Milling Company. Capital stock, $15,000. The purpose of the company is to develop mines and to operate mills for the reduction of ores, take leases on mining property and mills, to acquire by purchase, lease, entry, grant, devise, gift, or otherwise, real estate or other property, etc. Directors : S. S. Griswold, J. G. Brown, H. M. Johnson, A. B. McGill, and F. E. Bushby. Fountain Mining Company. Capital stock, $1,000,000. Directors : S. H. Appel, President ; I. N. Zeang, Robert Colton, John F. Miller, T. O. Batch, George H. Allen, George Rousberger, Harry Palmer, and George Brandel. Operations, Colorado. The principal office will be at Bellefontaine, Ohio, with a branch office at Salida, Colo. Goldfinch Mining Company. Capital stock, $300,000. Directors : Louis D. Oviatt, Henry W. Preston, Abraham Clawson, George T. Dell, and Lewis H. Dickson. Office, Longmont, Colo. Grand Duke Mining Company. Capital stock, $800,000 ; shares, $10 each. Directors : John C. H. D. Block, Henry L. Rozier, Gustavus St. Gem, Edward A. Rozier, and Joseph Meredith. Operations, Colorado. Principal office, St. Louis, Mo., with a branch office at Rico, Colo. Grant & Sherman Mining Company. Capital stock, $30,000. Operations, Chaffee County, Colo. King Mining Company. Capital stock, $400,000 ; shares, $5 each. Directors : Joseph K. Baker, President ; Clarence F. Whitaker, Secretary ; Stephen C. Perry, Daniel T. Copeland, and Thomas Appleton Operations, Colorado. Principal office, Portland, Me. Leadville & Aztec Mining Company. Capital stock, $500,000. Directors : Theodore Dugalshe, Simeon Dunbar, and William Laild. Mint Mining Company. Capital, $175,000 ; shares, $50 each. Directors : Relief Jackson, James K. Pattison, John Levering, William Wallace, H. W. Moore, Joseph S. Hanna, A. W. Abbott, Dr. J. M. Smith, William H. Keller, James S. Warwick, all of Lafayette, Ind. ; and James M. Harris, of Georgetown, Colo. Operations, Clear Creek County, Colo. Principal office, Lafayette, Ind. Nestor Mining Company. Capital stock, $1,000,000. Operations, Park County, Colo. New York & Colorado Mining Syndicate and Company. Increase of capital stock from $100,000 to $200,000 ; shares, $100 each. Principal office, Denver, Colo. Pacific Mining Company Capital stock, $100,000. Directors : Eli Punston, William Stockston, S. P. Weller, R. J. McConnell, Benjamin Ives, J. Piccioli, and W. Smith. Operations, Garfield County, Colo. Principal office, Denver, Colo. Palmer Group Mining Company. Capital stock, $1,000,000. Park County Sampling and Concentrating Company. Capital, $32,000 ; shares, $100 each. Directors : Hon. T. M. Patterson, H. Butler, Cecil C. Morgan, William M. Clarke, and Felix Leavick. The officers are : Hon. T. M. Patterson, President ; H. Butler, Secretary ; Cecil C. Morgan, Manager ; William M. Clarke, Superintendent of Works. Operations, Park County, Colo. The principal offices are at Denver, with a branch at London Junction, Park Co., Colo. Royal Gorge Smelting Company. Capital stock, $50,000 ; shares, $50 each. Directors : A. R. Gumaer, W. R. Harp, and J. W. Taylor. Operations, Fremont County, Colo. Principal office, Cañon City, Colo. Rustler Mining Company. Capital stock, $75,000. Directors : John W. Blades, Jeff Harper, William O. Parker, and William Brown, of Chaffee County, and John O. Fry, of Ringgold County, Iowa. Operations, Chaffee County, Colo. Snow Mass Mining and Milling Company. Capital stock, $150,000 ; shares, $10 each. Directors : James L. Peck, John S. Blankman, George H. Pays, and Henry T. Spring. Operations, Gunnison County, Colo. Principal office, Denver, Colo. Sterling Mining Company. Capital stock, $100,000 ; shares, $1 each. Directors : Oscar G. Roedel. Hiram A. Johnson, Jesse V. A. Craighead, Heinrich Hemmerling, and Reinhard T. Niegold. Operations, San Juan County, Colo. Principal office, New York City, with a branch office at Mcgoldstown, Colo. St. Louis Syndicate Mining Company. Capital stock, $2,000,000. Directors : John F. Watkins, William A. Adams, and E. L. Davis. Union Reduction-Works. Capital stock. $50,000. Incorporators : William K. Burchiaell, P. J. Cunningham, George W. Bittinger, E. A. Gilbault, Matthew Moynahan, William Walsh, and Christopher E. Bloome. Operations, Chaffee, Lake, and Pitkin counties, Colo. United Silver Mining Company. Capital stock, $1,000,000 ; shares, $10 each. Directors : John A. Reid, John T. Sheaver, and Martin Johnson. Operations, Saguache County, Colo. Principal office, Chicago, Ill. Ute Pass Mining Company. Capital stock, $1,000,000. Directors : James Hadley, George O. Willard, Charles A. Hunt, Leander W. Jones, and William Hamilton. Operations, Colorado. Principal office, Salida, Colo. Warrior Mining Company. Capital stock, $300,000. Directors : C. W. Burke, Samuel Batchelor, and J. M. Fitzpatrick. Principal office, Cincinnati, Ohio.

BOULDER COUNTY.

Among the mines now worked in the vicinity of Boulder are the Senator Hill, Little Pittsburg, Lamon, Alice Fay, Eclipse, Reliable, American, Mountain Lion, and several others. The Senator Hill has four shafts ; but two of these are now worked, with a force of ten men. Good ore is shipped regularly every week. On the Little Pittsburg, rich mineral has been encountered in shaft No. 2, which is 40 feet deep, and is timbered to the surface. The ore mills 161 ounces gold per ton. The Ward-Lamon continues to show good prospects. At a depth of 20 feet, good ore has been encountered in the Alice Fay. The Eclipse, located east of the famous Kekionga, has encountered a large body of low-grade ore. The American Eagle continues to ship regularly. The Mountain Lion is nearly ready for the resumption of work. Men have been diligently at work getting out water and rubbish, and this week the lower levels will be cleaned, when a large force of men will begin work.

CHAFFEE COUNTY.

MADONNA.—It is estimated that there are more than twenty thousand tons of ore in sight. This mineral carries forty per cent lead and from seven to ten ounces of silver per ton.

MONARCH.—The mine shows a vein a foot and more in width of good ore ; the property is worked.

CLEAR CREEK COUNTY.

DIAMOND TUNNEL.—A new lease has been taken on the surface of the Corry City, and arrangements are making to put up machinery to pump out the water in the shaft and to otherwise prosecute work. There is a fine body of milling ore in the bottom of the shaft, but the shaft will have to be re-timbered before any more work is done there. Drifting is done on the lodes cut in drifting through the Corry City in the main tunnel, and as work progresses, better results are obtained, the streaks becoming more solid. Work is pushed on No. 5 lode with good results, the lower grade from this lode going 60 ounces silver and 10 per cent lead. In the V lode west, water has been encountered.

GOLDEN DUSTMAN.—It is reported that a strike of two inches of carbonate of copper has been made in this lode, on Soda Creek, at a depth of twenty-five feet. The crevice is two and a half feet wide; and besides this, the carbonate of copper which is on the hanging-wall carries from two to five inches of iron on the foot-wall.

KOHINOOR & DONALDSON.—The company will have the extensive building for its new mill completed and all ready to receive the machinery by the end of the present month. The dimensions of the building are 160 by 150, with a wing. The mill, when finished, will be one of the largest in the State. During the past week, regular shipments of smelting and milling ore have been made from the Champion and Donaldson mills.

DOLORES COUNTY.

An idea of the vast mineral resources of our district, writes a correspondent of the Denver *Republican* from Rico, may be gained from the number of pay mines which are now profitably operated, namely, the Grand View, Phœnix, Yellow Jacket, Newman, Chestnut, Swansea, Swansea Extension, Uncle Ned, Puzzle, Puzzle Extension, Lillian Davis, Pigeon, South Park, Garfield, St. Louis, Little Maggie, Zulu Chief, Johnnie Bull, Iron Clad, C. B. & Q., Spanking Jack, Parole, Santa Clara, Waubath, R. E. Lee, Carbonate, Nora Lilla, Corsair, Tex, Utah, Legal Tender, Fort Wayne, Hog Back, Black Demon, Bilzora, Sundown, Bancroft, Mogul, Bay State, Hope & Cross, Paymaster, Nos. 1 and 2, Petzite, Sinbad, Lackawanna, Midnight, Grand Duke, Nevada, Shamrock, Uncle Jess, Rico, Gunshot, Elgin Boy, François, Australia, Silver Duke, Black Hawk, Mabel King, Maid of the Mist, Camp Bird, Franklin, Orphan Girl, Santa Rosa, Belle of Rico, and Aztec. About one half of the above list is now shipping ore daily. The others may properly be classed among the mines not at present operated. All the mines will be worked this season.

GRAND VIEW.—The mines of the company are among the early locations of the camp, and are in name the Grand View, Yellow Jacket, Pelican, Major, Aztec, and Elliott lodes. They are well developed, there being in the aggregate 2308 feet of tunnels, shafts, drifts, and rises. So far this season, they have produced 1650 tons of ore. The smelter has been running successfully for some time. The company owns extensive coal-banks, operates its own coke-ovens, has a fire-clay claim, mines its own coal, burns its coke, and makes its brick. Notwithstanding the fact that the works are extensive, large additions will be made this season.

GILPIN COUNTY.

COLORADO DRY ORE CONCENTRATING AND SAMPLING COMPANY.—This company has been organized at Central City, with a capital of $600,000, for the purpose of constructing and operating concentrating and sampling-works in Colorado. The concentrating mill of Messrs. Thurmond & Hamilton, in Russell Gulch, and the State right for the Thurmond dry ore concentrator, have, according to the *Register-Call*, been purchased. The company will build a mill of from sixty to seventy tons capacity at Bonanza, Saguache County.

GUNNELL.—The statement for April shows smelting ore sold, $4549.83 ; gold retorts, $2503.50 ; tailings sold, $261.66. Total, $7314.99.

KEYSTONE.—This lode is now opened up for a distance of over 400 feet. The main shaft is down 110 feet; another shaft has attained a depth of 80 feet; both are connected by a drift. West of the deep or main shaft, a level has been driven 40 feet in length, which thus far has passed through a good-sized body of ore. In fact, so far as the developments have been extended in sinking or drifting, the vein shows up well, and in places six feet of crevice-matter are exposed. The average of the ore is stated to be four ounces gold per cord. The average width of the pay-matter is fully four feet.

MARGARET GLENNAN.—This lode has been tapped through the working of the Midas tunnel, 600 feet in from the entrance. At the point where the vein was intersected, a wide body of crevice-matter has been passed through 300 feet below the surface. Work on this vein was closed down some months ago, awaiting the driving of the Midas cross-cut, which will drain the vein to the depth as above stated. Levels are driving each way from the shaft, and an uprise to make connection with the main shaft.

GUNNISON COUNTY.

A correspondent of the Denver *Republican* states that considerable work has been done during the past winter. Among the most promising properties worked are the Whopper, Lulu, Eureka, Brittle Silver, Scorpion, Gray Copper, and Clarke No. 2, which has a fine large vein, and is developed by a 150-foot tunnel. At the depth of 140 feet, they struck a large body of mineral, which carries silver glance and galena.

Rock Creek will show up considerable mineral the coming summer. As there is good coal, it would be well to erect a smelter or concentrator at Crystal City this season, this point being the richest section of Rock Creek, with very little snow to interfere with the operating of mills all the year round, and mines within 1000 feet of town, and coal-banks eight miles from here, with a wagon-road most of the distance.

LAKE COUNTY.

COLONEL SELLERS.—The lower portion of this property, on Iron Hill, is operated by lessees, and a shaft has been sunk in the gulch. This shaft is 128 feet deep, and a large body of contact has been struck and penetrated about three feet. Assays have just been made which returned thirty-two per cent in lead, one and a half ounces gold, and sixteen ounces silver per ton.

ELGIN SMELTER.—A company of Chicago capitalists will start up the smelter very shortly. The machinery is now overhauling and remodeling, and the smelter placed upon a basis equal to any of the others in the camp. Contracts will be made for ore.

IRON SILVER.—In the Seventy-Six portion of the Iron Silver property, which is operated under a lease, a new strike was made recently. New prospect-drifts have been run from the old workings, and a body of high-grade lead carbonates has been cut, which is five feet in thickness.

LA PLATA MINING AND SMELTING COMPANY.—The result of the working for the quarter ended March 31st shows, according to the London *Mining Journal*, a net profit of $20,500. The management states that the only indebtedness of the company consists of money required from time to time to pay for ore purchased, and that such borrowings are represented in the ordinary course of business by ore on hand awaiting smelting, or bullion in stock or in transit. The profits realized as above stated will go to improve the financial position of the company and reduce the amount of loans, for which the directors at present give the banks their personal guarantee.

A dispatch from Denver says that the Harrison Reduction-Works at Leadville, a branch of the St. Louis Smelting and Refining Company, was destroyed by fire May 17th. The loss is from $60,000 to $70,000.

SAGUACHE COUNTY.

The erection of a concentrator and sampling-works of the same pattern as those now in operation in Russell Gulch in Gilpin County, has begun.

JUNE.—Active work is doing in this mine, the extension of the Rawley, and large quantities of ore will be shipped as soon as the road is constructed.

SUMMIT COUNTY.

A very large and enthusiastic meeting of citizens and miners was held at Kokomo recently, for the purpose of making a united effort for the development of the mineral resources of Summit County, and especially to bring into prominence the rich mineral deposits lying adjacent to Kokomo. The Denver *Republican* says it is a well-conceded fact that this rich mineral district has largely contributed to the bullion output of Lake County, for which it has not been properly credited, and the miners and mine-owners are determined that in this year's output they shall not be misrepresented, but will take their place as the second largest mineral-producing county in Colorado, to which they are justly entitled.

ROBINSON.—The machinery for the new concentrator to be erected at the mine by Mr. Greer, the lessee, has begun to arrive. The process will be dry, and, according to the stipulations of the lease, must be capable of treating 144 tons per day.

QUEEN OF THE WEST.—It is stated that another pocket of sulphurets has been struck in the tunnel. The ore will probably mill-run one hundred dollars per ton.

DAKOTA.

It is reported that a group of five mines, the Emma, Carrie, Nebraska, Flora Temple, and Marietta, together with the Mountain Lion Gulch water-right, has been leased to two Toronto capitalists, who have the option to purchase the property on or before July 1st for $250,000. The mines are in Nevada Gulch, Bald Mountain District, and are said to be valuable.

The Estrella del Norte, Deadwood, and Rockerville hydraulic companies are working with large forces, and are engaged almost wholly in placer mining. Prospects are good.

FATHER DE SMET.—The superintendent's report from April 22d to May 1st shows ore extracted from first, second, and third levels, 2700 tons. Ore milled, 2700 tons. North end tunnel advanced 10 feet; tunnel in 884 feet. Golden Gate north header advanced 11 feet; header in 94 feet. Tramway level rise up 59 feet.

MINNESOTA.—A dispatch to the New York *Tribune* says that the bond held by Boston parties on this mine, Silver Creek District, has expired, greatly to the satisfaction of the owners, who, after having tied themselves through the bond, discovered that middlemen were endeavoring to make for themselves $60,000, or considerably more than the owners were to receive by the agreement. The mine would now doubtless be producing largely but for the circumstances mentioned.

PANTHEON.—A large force of men is at work on this group, Box Elder, recently purchased by an English syndicate. The property will be thoroughly opened prior to the erection of two 120-stamp mills this season.

SITTING BULL.—Work at the mill has been delayed by bad weather, and the enlargement will not be completed for several weeks yet. The old part—ten stamps—continues in operation.

GEORGIA.

A correspondent of the New York *Evening Telegram* writes that, owing to the recent opening of a new railroad—the Georgia Pacific—through this country, the gold fever has again broken out in places, and this section is attracting the attention of men who have the inclination and the means to test the real merits of Carroll County as an ore-producing region. The people of Villa Rica are not very much worked up over their prospects of making speedy fortunes, although they have the strongest confidence in the wealth of the surrounding country. The owner of an abandoned mine near the town has been offered $8000 for her property, but indignantly refused the offer, and announced $100,000 as the very lowest cash price. On rainy days—and such days are very frequent here during February and March—the farmers around the village economize their time by "surface mining" for gold. Some of these farmer-miners have succeeded in getting rich returns for their rainy-day work. While none of the old mines is developed by the regular processes, owing to the great cost of improved machinery, the amount of placer mining done is surprisingly large, and in many cases where this surface mining is followed as a regular business it is very lucrative. The region about Dahlonega, in upper Georgia, is quite different in its geological formation from the country about Carrollton. Until this revival of the gold mining fever in Carroll County, the fact that Georgia is a gold-bearing State has been associated almost entirely with the region about Dahlonega. Should the experiments in Carroll County turn out as well as it is expected, it will not be long before Georgia will rank well as a gold-producing region.

IDAHO.

The Paragon, Hawkeye, Bull Dog, and Silver Dome mines, located in Little Wood River Mining District, one mile north of the Solid Muldoon mine, have been sold for $10,000. An undivided interest of 1400 feet in the American mine, and an undivided interest of 1350 feet in the Gray Eagle mine, have been sold to the same parties for $4000.

DAVITT.—The mine improves in depth. The force of miners is increased. The shaft is 40 feet below the lower tunnel. The first lot of ore from the mine, thirty-five tons, has been taken to the Hailey Sampling-Works.

EMERY.—The ledge is 12 feet wide, of which 4 feet are mixed carbonate and galena, assaying from 63 to 210 ounces, and carrying from 60 to 76 per cent lead to the ton. It is tapped, at a depth of 45 feet, by a tunnel about 100 feet long.

MEXICO.

A correspondent of the Mexican *Financier* says that a number of miners have been discharged from the Encino mine. It is understood that, as soon as the new Progreso mill is finished, work will be resumed and the ores will be sent there for treatment. There are from six to seven thousand cargas (112 pounds to the carga) of ore ready for milling, of an average value of at least eleven dollars per carga.

The Real del Monte is sinking the San Ignacio shaft to the Aviadero water-level. This will open up a sixty-foot stope of ore thirty feet wide and averaging 150 per ton.

The lawsuit pending between Landero & Co., as representatives of the Real del Monte Company, and a Mr. Pascoe, for the possession of the San Patricio mine, promises to be a long and bitter struggle, which may help to explain to outsiders some of the recent proceedings of this powerful company. The almost undisputed monopoly long enjoyed by these people in this mining district has certainly been an immense detriment to the country; for foreign capital has hesitated to invest in a district where it might at any moment come in conflict with the claims or pretentions of this well-established monopoly. The above case will probably be fought out, although it is an open secret that large sums of money have been offered for a compromise and withdrawal of the suit. The decision in this case will determine many other cases of disputed possession here.

At the La Blanca, the perpendicular shaft has been sunk 140 feet with a windlass. The purpose is to drive it still deeper until it intersects the Santa Gertrudis lode.

The Rosario, in El Chico District, has just erected a small horizontal steam-engine, which has already drained the mine to a depth of 200 feet. The property was abandoned some years ago from inability to handle the water.

At the San Sebastian mine, they are driving a cross-cut to intersect the lode which yielded rich metals at a depth of about 80 feet. This new cross-cut will strike that lode at a depth of about 250 feet.

The Guadalupe reduction-works have begun operations. It is a combination of the patio process and the Cornish crusher. The first run has been made.

A report from Chihuahua says that Mr. James Hitchens, the owner of most of the slags situated within and around the city, has, in connection with some Eastern capitalists and first-class metallurgists, commenced a general and thorough sampling of the slags, for the purpose of ascertaining their value and to decide upon the best class of metallurgical works for their proper and most efficient reduction. It is also the intention of the company to provide for the purchase and reduction of large quantities of silver, lead, and copper ores from the numerous surrounding mines.

NEW YORK & HONDURAS-ROSARIO MINING COMPANY.—Important strikes are reported to have been made recently in the mines of this company. The superintendent has telegraphed that every thing was highly satisfactory, and he assures good shipments of bullion during the present month. The great difficulties to be overcome and the large amount of work necessary in putting up pans, building flumes, etc., prevented an earlier start of the mill. Mining Captain Smith reports large bodies of rich ore in the Rosario, Matraca, Encinos, and New York mines. The vein in the fifth level of the Rosario is five feet thick, and is improving. The rich ore reported in the Encinos last December has not been removed, it being thought best to leave it in position until the mill was ready to receive it. It is now the intention to extract it at once.

MICHIGAN.

JACKSON.—A curious occurrence of ore has been developed by a drift to the south from the second level of No. 7 pit. This drift has been driven nearly 400 feet south from the main ore-body, following a narrow lead of ore from 4 to 5 feet thick, and which shows indications of widening out as it goes down. This deposit or lead seems to lie almost at right angles with and across the jasper formation, which lies to the south of the main opening, and apparently with entire non-conformity to the surrounding rocks.

NORWICH.—It is stated that arrangements are making to reorganize this company.

MONTANA.

POSER.—This mine, located on the east end of the great Rainbow lode, is developing into a property of great productiveness. Two shafts are sinking on the claim, the east shaft now being down 95 feet on the vein, and showing good ore all the way from the surface. At the 100-foot station, a cross-cut will be run north and south, to determine the full width of the ledge. It is from the west shaft that the ore is extracted. It is down only to the water-level, about 45 feet; the east and west drifts are vigorously forwarded, and in each drift a breast of ore 8 feet wide is extracting. No attempt is made to extract the full width of the ledge. Three eight-hour shifts are employed, and the daily product of the mine averages 25 tons, which could readily be doubled if desired. The Poser is leased, and its product is treated in the Silver Bow mill.

NEVADA.

ALBION CONSOLIDATED.—The superintendent writes that the fissure drift for the last week has run into hard lime. I have started a cross-cut at the point where the drift showed the best indications, and am now running the cross-cut nearly under the old chamber found in the east rise workings. I have discontinued in the second drift, as it had run beyond the uprise of the ore-bodies found near the line, and have started a drift near the ledge cave, which is more promising ground. The Uncle Sam rise is still in good ground. I have opened the most southerly of the flue-drift tunnels, and will continue it into the hill. Some of the ore-bodies found near the line and a few feet below the level of this tunnel and this ground can be developed to good advantage from this tunnel. We have developed some ore making above the large caves, and are now taking out some rich ore from this point. Some ore has also been found making off from the inside chamber, but very little has been done in it yet.

NEW MEXICO.

An important strike of gold ore has been made thirteen miles southeast of Santa Fé, and four miles northwest of Glorieta.

A report states that at a sheriff's sale at Socorro, the Silver Bar and Olla mines were purchased by J. D. Caughran, the highest bidder, for $55,600. These mines compose the Cooney group, in the Mogallons. By bad management, the owners became involved for about $80,000, and this sale was the result of judgment for debts.

SANTA RITA DEL COBRE MINES.—The Secretary of the Interior has declined the request of Martin B. Hayes to vacate the approval made by the Commissioner of the General Land-Office of entries upon the mines known as Santa Rita del Cobre, consisting of forty-five lode claims entered by D. H. Moffat, Jr., and patents will accordingly be issued in favor of the mining claimants.

TEXAS.

Advices from the Cariso Mining District, in Western Texas, state that an immense deposit of chloride and horn-silver has been discovered in the neck of country lying between the Pecos and Rio Grande rivers. The surface croppings of horn-silver are said to be very rich.

UTAH.

ANTIMONY REDUCTION-WORKS.—The works, which are situated 120 miles from Juab, are completed. The output of the property promises to be a steady one.

MAMMOTH.—Although the work at this mine has been disturbed somewhat by complications among the purchasers, it has not ceased by any means, says the Salt Lake *Tribune*. The refining-works have been completed, and there are fourteen furnaces done. The ores taken out during the last three months averaged $53 in value, summing the gold, silver, and copper. The mine is said to be improving. The theory has been adopted that it bends and pitches into the hill, like so many other big mines, about 300 or 400 feet below the croppings, although, if it is a contact vein, this is against the rule. But an incline has been started from the 400 level on this theory, and at 70 or 80 feet it is in a fine body of ore, which is opening by drift and cross-cut. This level has been driven farther north with encouraging results. A tunnel has been run into the big cave, and the loose material is to be taken out. The Young Mammoth, worked from the surface, lying just back of the old patented ground, is growing larger under working than the original ore-body, although there were few ever seen of such proportions. Something like $200,000 has been paid on the property, besides the money expended in the reduction-works.

ONTARIO.—The present run of the mill began eight months ago. The mill is now to be shut down for fifteen days, in order that it may be thoroughly repaired. Work has not been stopped in the mine. The inflow of water is great just at present, but not greater than can be handled. As the mine drains a large space of ground, large quantities of water flow into it in the spring. This is now decreasing, as the snow is rapidly disappearing.

WYOMING.

The mines of South Pass are looking well, and give fair promise of making a good showing this season. The Carrissa property has been leased. The mine has a large body of $15 free-milling ore in sight. Belonging to the property is a five-stamp gold mill, operated by water power. This mill can be doubled in capacity, the water-wheel and quantity of water being ample for this. This mill is located only half a mile from the mine, hence the cost of getting ore to the mill and reducing is small, and can be further reduced by putting in mo stamps, which will require no more hands to operate. On the Pitkin and G born, considerable work has been done. A shaft has been sunk; but owing to t water that was encountered, work was abandoned and a tunnel 400 feet length driven. The present outlook of the district is very good.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, May 18.

There was a better feeling in the mining market this week, and the transactions have been of a more general and better character than for some time past. The Comstock shares show quite an improvement in prices, and have been fairly dealt in. Some of the Leadville stocks have also improved in price. Sonora was the active stock of the market, but the price did not change materially either way. Eureka Consolidated was a feature of the market on account of its weakness. It suffered a very heavy decline, closing weak to-day. The total number of mining shares sold at all the Exchanges aggregates 237,700, as against 173,917 last week.

The Comstock shares were fairly dealt in, and were strong. California was quiet and steady, selling from 21@23c. Consolidated Virginia had an active business at strong prices; it sold from 48@55c. Sierra Nevada showed considerable strength under a small business, and sold from $3.90@$5.75. Union Consolidated was also strong, the sales aggregating 730 shares at $4@$5.13@$5. Mexican records a small business at steady prices, selling from $2.75@$3. Consolidated Imperial sold at 8c. Yellow Jacket records one transaction at $3.75. Best & Belcher was quiet and strong, selling from $3.75@$4.25. Sutro Tunnel had a fair business at steady prices; it sold from 21@20c.

The Leadville stocks were moderately dealt in at steady prices. Amie Consolidated had a small business and was irregular, selling from 20@17@18c. Chrysolite was steady throughout at $1.10, recording a business of 1700 shares. Iron Silver was fairly dealt in at steady prices; it sold from $2.90 $3.05@$3. Leadville had a small business, and was a little weak; it sold from 65@60c. Little Chief was quiet and steady, and sold from 52@50c. Little Pittsburg was very strong, under a fair business, selling from 57@90@88c. Climax sold at 9c.; the transactions were small.

The Bodie stocks had a small business, and were weak. Bodie Consolidated sold from $1.05@95c.@$1, with a business of 1000 shares. Standard was quiet and irregular, selling from $6.50@$6@$6.25. Bulwer records a business of 900 shares at 60@50c.

The Tuscarora stocks record small transactions, and were generally a little weak. Grand Prize sold from $1.15@$1, with a business of 1000 shares. Argenta sold at $1.15, with a small business. Navajo was a little weak, under moderate transactions, and sold from $2.40@$2. Independence was quiet and weak at 56@40c. Elko Consolidated sold at 20@21c., with a business of 2500 shares.

In the miscellaneous list, Alice was quiet and a little weak, selling from $3.25@$3. Bassick sold from $8.25@$8, with a business of 250 shares. Eureka Consolidated has been quite weak, under a small business, declining from $4.90@$2.65. The Green Mountain stocks were quiet and steady. Gold Stripe sold at 9c. Green Mountain sold at 79@77c., and Cherokee at 4c. Hall-Anderson records but one transaction, and that at $1.40. Homestake was moderately dealt in at steady prices, selling from $16.25@$16. Horn-Silver was irregular, with a small business, and sold from $6.63@$6.38@$6.75. Hukill declined from 8@6c., the business being small. Northern Belle records a fair business at very irregular prices; it sold from $7@$6.38@$7. Ontario was also irregular, under a small business, selling from $25.50@$24@$24.50. Robinson Consolidated records a fair business at irregular prices; it sold from 89@83@87c. Sierra Grande was quiet and weak, selling from $1.25@$1, with a business of 4700 shares.

Alta-Montana was very quiet at 4c. Bull-Domingo sold at 6c. Caledonia (B. H.) was quiet and steady at 75@80c. Central Arizona sold at 30c. under a small business. Decatur was active and steady, selling from 4@5c., the sales aggregating 22,200 shares. Harlem was quiet and steady, and sold at $1.40@$1.45. Lacrosse had a fair business at steady prices; it sold from 12@13c. Oriental & Miller records a small business and was steady, selling from 14@15c. Rappahanock sold from 8@7c. under a business of 8700 shares. Sonora Consolidated was very active and very irregular; it sold from 36@49@47c. South Hite sold at 15c.

The stockholders of the Harshaw Mining Company held a special meeting on Tuesday last, the 16th inst., at 62 Cedar street, this city, and decided to wind up the business of the company. The reason given for this action is the "petering" out of the mine.

The Iron Silver Mining Company has over $200,000 in its treasury, and will probably, at an early date, announce a dividend of $100,000. The company keeps $1,000,000 in reserve, and allows its profits to accumulate until they aggregate $200,000, when a dividend of $100,000 is distributed.

The Potosi Mining Company has levied an assessment of 25 cents per share. The Belle Isle and the North Belle Isle mining companies have each levied an assessment of 20 cents per share.

MEETINGS.

Bonanza King Consolidated Mining Company, No. 29 Wall Street, New York City. Meeting of stockholders, for the purpose of approving an agreement made and entered into on the 11th day of May, 1883, by and between the Trustees of the Bonanza King Consolidated Mining Company and the Trustees of the Trojan Consolidated Mining Company, to consolidate such companies into a single corporation, pursuant to chapter 960 of the Laws of the State of New York for the year 1867. June 16th, at two o'clock P.M.

Dunderberg Mining Company, Nos. 90 and 92 Broadway, Room 37, New York City. Annual meeting of stockholders and election of trustees, June 5th, at three o'clock P.M.

Golden Rule Mining Company, No. 115 Broadway, Room 126, New York City. Annual meeting of stockholders and election of trustees, May 25th, at three o'clock P.M.

Oro Cache Gold Mining Company, No. 1 State street, New York City. Meeting of stockholders, May 28th, at ten o'clock A.M.

DIVIDENDS.

The Contention Consolidated Mining Company, of Arizona, has declared its regular monthly dividend (No. 16) of twenty-five cents per share, payable May 28th, at the office of the Farmers' Loan and Trust Company, on all stock registered in New York. Transfer-books close May 18th.

The Homestake Gold Mining Company, of Dakota, has declared its fifty-seventh dividend of $50,000 (for April), payable at the office of the transfer-agents, Messrs. Lounsbery & Haggin, No. 15 Broad street, on May 25th. Transfers close May 19th. The total of the Homestake's dividends to date now reaches $1,112,500.

The Navajo Mining Company, of Nevada, has declared a dividend (No. 9) of twenty-five cents per share, payable May 14th.

PIPE LINE CERTIFICATES.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
May	12....	$0.92⅛	$0.95	$0.92⅝	$0.95	2,450,000
	14....	.95⅜	.97⅝	.94⅞	.97⅜	2,324,000
	15....	.97⅝	1.03	.96¾	1.02½	4,415,000
	16....	1.02⅝	1.05	1.00½	1.01⅝	6,042,500
	17....	1.02¼	1.04⅝	1.00⅝	1.02⅛	5,147,000
	18....	1.03⅜	1.04¾	1.02¼	1.02⅝	3,068,000
Total sales.....						23,446,500

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, May 17.

To say that the market for mining stocks is dull and inactive but feebly expresses the situation. There is so little doing in copper stocks that it is difficult to get reliable quotations from day to day, while the sales are almost entirely confined to two or three stocks, and those of the dividend-paying mines. At the morning Board to-day, there was not a transaction recorded, and the business of the week would hardly suffice to give one broker a good living out of his commissions. Calumet & Hecla is steady at $233@$234, with sales of less than 50 shares for the week. The advance in Quincy of last week was not maintained, the stock declining to $43 on small sales. Osceola sold at $21, same as last week. Franklin sold at $10⅛. Ridge sold at 65@75c.

In silver stocks, there is absolutely nothing doing. A few sales of Bonanza were made at $2@$2⅛. Catalpa sold at 72½@75c., and a small lot at 70c. Harshaw, 50c.; and San Pedro, 45c.

At the Boston Mining and Stock Exchange, there is but little doing in the specialties dealt in. Empire is firmer at 22c. bid, but very little stock is offered, being held largely by a few parties interested. Massachusetts & New Mexico shows a little more firmness, with sales at 8c., while the bonds have advanced from $17@$24 on the report that the coupons due in June would be promptly paid.

3 P.M.—At the afternoon Board, Calumet & Hecla sold at $234. Catalpa broke from 72@65c., with sales after the Board at 62½c. We are informed that a dividend of 10c. per share will probably be declared, payable next month. Closing prices: Allouez, $2 asked. Atlantic, $10½ bid. Bonanza, $2@$2⅛. Antimony, $12@$15. Calumet & Hecla, $230@$233. Catalpa, 65c. asked. Crescent, 25c. bid. Franklin, $10 bid. Harshaw, $1¼@$1⅝. Huron, $1½ bid. Osceola, $20 bid. Quincy, $4½ bid. San Pedro, 40@50c. Silver Islet, $4 asked. Sullivan, $1 bid.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. May 11.	May 12.	May 14.	May 15.	May 16.	May 17.
Albion	....	....	....	....	....	....
Alpha	1½	....	1¾	1¾	....	1¾
Alta	.50	.50	.50	.60	.60	.70
Bechtel	....	....	....	....	....	....
Belcher	1	1	1	1	1	1
Belle Isle	11-32	11-32	.35	.35	.35	.30
Best & Belcher	3⅝	3¾	3¾	3⅞	3¾	4
Bodie	1	13-16	.85	.80	.95	1⅛
Bullion	....	....	....	....	....	....
California	.20	¼	.20	.20	¼	....
Challar	....	....	....	....	2⅜	2½
Con. Virginia	7-16	7-16	.45	.50	½	½
Crown Point	1¼	1⅜	1⅜	1⅜	1¼	1½
Elko Cons	¼	¼	....	....	....	.20
Eureka Cons	5	....	4⅝	4½	4	3
Exchequer	¼	¼	.30	.35	.30	.35
Gould & Curry	2⅜	2½	2½	2½	2⅜	2⅜
Grand Prize	1	1	.90	1	.95	1
Hale & Norcross	3⅝	4	4	4	3⅞	4¼
Independence	....	....	.50	.50	.20	.30
Martin White	....	....	.35	.35	....	.30
Mexican	2¾	2¾	2¾	3	3	3⅜
Mono	....	....	....	....	....	....
Mount Diablo	2	....	....	2¾	2½	2¾
Navajo	2¼	2¼	2	2	2	2
Northern Belle	6¾	6⅝	6	6	6¼	6⅜
North Belle Isle	....	....	.25	....	....	....
Ophir	2	2	2	2⅛	2⅛	2⅜
Overman	....	....	....	....	....	....
Potosi	1¼	1¼	1¼	1¼	1¼	1¼
Savage	2	2⅛	2	2⅛	2⅛	2⅛
Scorpion	....	....	....	....	....	....
Sierra Nevada	4	4	4⅛	4½	4¾	6
Silver King	10½	....	....	....	10½	10½
Tip-Top	....	....	.50	.45	.35	.40
Union Cons	3⅞	4	4⅛	4¼	4¼	5
Wales Cons	3-16	3-16	.25	....	....	....
Yellow Jacket	3⅛	3⅜	3⅜	3¾	3¾	4⅛

BULLION MARKET.

NEW YORK, Friday Evening, May 18.

The market has been nominal and stagnant abroad and here, owing to the very liberal sales of bills on India by the Council in London, meeting all the demands for exchange and preventing an advance in silver which would otherwise probably have occurred.

DATE.	London Pence.	N. Y. Cents.	DATE.	London Pence.	N. Y. Cents.
May 12	50⅛	109¼	May 16	50 1-16	109⅜
14	50⅛	109¼	17.	50 1-16	109⅜
15	50 1-16	109⅜	18.	50 1-16	109⅜

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended May 18th, as compiled from various sources, amounted to $149,000, as against $157,000 reported for the previous week. The receipts from January 1st, 1883, to date are $4,985,713.53.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank lost £691,000 bullion, and the proportion of its reserve to its liabilities was reduced from 33 7-16 to 32⅝ per cent, against 42⅝ per cent at same date last year. The weekly statement of the Bank of France shows gains of 2,100,000 francs gold and 115,000 francs silver.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended May 11th	$170,875
Corresponding week last year	3,675,184
Since January 1st, 1883	5,497,742
Corresponding period last year	21,129,297

Imports.

Week ended May 11th	$46,767
Corresponding week last year	11,963
Since January 1st, 1883	6,542,026
Corresponding period last year	1,516,842

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14½ per cent, to arrive at actual value.

MINES.	States.	Month of April.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont	.....	$234,193
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	.....	12,604
Bodie, G. S.	Cal	25,085	91,342
Bodie Tunnel, G.	"	10,470	45,319
*Bonanza King, G.	"	57,000	199,077
*Boston & Montana, G.	Mont	18,741	72,318
*Central Arizona, S.	Ariz	.....	35,845
*Christy, S.	Utah	.....	68,405
*Chrysolite, S. L.	Colo	24,146	142,238
*Contention, S.	Ariz	.....	209,260
Crescent, G.	Cal	.....	13,000
*Custer, G. S.	Idaho	.....	43,572
*Deadwood-Terra, G.	Dak	.....	120,231
*Derbec Blue Gravel, G. S.	Cal	10,041	31,844
*Father de Smet, G.	Dak	.....	101,389
*Frisco M. and S. Co., G. S. L.	Utah	16,366	$77,084
*Head Center and Tranquillity	Ariz	.....	4,593
*Hecla Cons., G. S.	Mont	.....	177,924
*Homestake, G.	Dak	.....	330,060
*Hope, S.	Mont	.....	20,574
Horn-Silver, S. L.	Utah	291,000	1,055,000
*Independence, G. S.	Nev	.....	26,943
*Kentuck, G. S.	"	.....	6,137
*Lexington, S.	Mont	96,317	421,204
*Little Pittsburg, S. L.	Colo	.....	19,577
*Marguerite, G.	Cal	.....	33,200
*Martin White, G. S.	Nev	.....	136,317
*Moulton, G. S.	Mont	.....	123,288
Mount Diablo	Nev	65,221	75,078
*Navajo, G. S.	"	.....	211,980
Northern Belle, S.	"	75,700	343,015
*Ontario, S. L.	Utah	222.274	807,695
*Oxford, G.	N. S.	6,181	21,324
*Phœnix, G.	S. C.	.....	†3,666
*Pinal Cons., S. L.	Ariz	.....	§49,810
*Satemo, G.	N. S.	.....	2,500
*Silver Bow, G. S.	Mont	29.433	101,241
Standard, G.	Cal	108,477	371,483
Star, S.	Nev	.....	27,095
*Stormont, S.	Utah	19,677	74,281
Syndicate, G.	Cal	4,869	14,086
Tintic M. and M. Co.	Utah	.....	7,632
*Tip Top, S.	Ariz	.....	‡22,983
*Tombstone, G. S.	"	53,071	‡246,230
Yellow Jacket, S.	Nev	54,120	152,873
Total amount of shipments to date			$6,486,434

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, May 18.

Copper.—Lake copper is developing more and more strength. There is very little of it in second hands, and first hands decline to part with any. The lots which were constantly thrown on the market by manufacturers who had taken other fine kinds have all been disposed of. For brands recognized by consumers for uniformity and known to them so far as quality is concerned, of course this means increased firmness, and for Baltimore and Anchor we quote the range 14⅝@15⅝c.

On the other hand, we hear of sales as low as 14c.; and as these may be misunderstood both by consumers and by producers, it is necessary to state that in all transactions at such exceptionally low figures there are special circumstances. The copper is either low in quality or the brand is entirely unknown, so that only special inducements will move buyers. We quote good ordinary to choice brands 14⅝@15⅝c.

London cables a little better, £62 10s. f. o. b. for Chili Bars; and Best Selected, £67 10s.

The following are the latest English statistics for the first four months of the year:

		Jan. 1 to April 30. 1883. Tons.	1882. Tons.	1881. Tons.
Imports	Chili	14,035	12,013	10,782
	Other foreign	13,333	11,555	10,761
		27,368	23,568	21,543
Deliveries	Chili	12,261	14,781	13,697
	Other foreign	12,365	7,900	8,131
		24,626	22,681	21,828

Stocks in Europe and afloat from Chili and Australia were, on the 30th of April, 49,961 tons, against 47,053 on the 1st of January, 1883, and 50,598 on the 1st of January, 1882.

Ores and regulus were quoted, on the 1st inst., 12s. @12s. 6d. per unit.

Tin.—The market has rallied under the influence of small shipments from the Straits and a concentration of stocks here. Business has been fair at 21¾@22c. spot cash for Straits.

England cables at the close £96 5s.

Lead.—Beyond the sale of a number of small lots aggregating from 200 to 300 tons of Common and Refined at 4·40c., there is nothing special to report. The news of the burning of the Harrison Reduction-Works at Leadville is still too recent to have any effect upon the market. It will probably cause holders to be a little stiffer, but is not likely to influence buyers much.

From St. Louis, Messrs. John Wahl & Co. wire us to-day:

Our market is firm. Buyers seem anxious to purchase, but do not want to pay more than 4·12½c. for Refined. Sales for the week sum up over 300 tons of Refined lead at 4·12½@4·15c., and 130 tons of Hard lead at 4·12½@4·10c. Holders, anticipating better prices, have withdrawn from the market at present, and refuse to make sales for future delivery at present prices.

Messrs. Everett & Post, of Chicago, wire us as follows: Our market is very quiet. Transactions foot up to 400 tons at 4·15c. We close nominally at 4·15c., with 4½c. bid.

Spelter.—Spelter dull and without any features of interest. We quote 4·70@4·80c.

Antimony.—There is no change to report.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 18.

American Pig.—Although the officers of a number of companies are talking about blowing out their furnaces, they seem to be slow in making up their minds, and the conviction is gaining ground that they will need the stimulant of a further decline. It seems probable now that prices have not as yet reached bottom figures, and $18@$20 for Nos. 2 and 1 is quite freely talked of as a thing not in the distant future. Buyers, of course, under the circumstances are not rushing in to cover requirements. We hear of sales of a few thousand tons for immediate delivery. We quote $21@$22 for No. 1 Foundry, nominally with the market in buyers' favor; $19@$20 for No. 2; and $18@$19 for Gray Forge. Bessemer pig is dull at $21@$22, and Spiegeleisen, of which a sale of 3000 tons is reported, at $32.50 for 20 per cent material, is fairly active.

Scotch Pig.—The demoralization in the American pig market of course seriously reacts upon Scotch iron, which is now held above the former, and therefore attracts very little attention. The arrivals are small and freights are firm at 5s. There is no probability of their declining during June and July. Transactions are on a very limited scale. We quote, ex ship: Coltness, $24@$24.50; Glengarnock, $22@$22.50; Eglinton, $21@$21.50; and Summerlee, $24@24.25.

Steel Rails.—All the mills but one are now working quite steadily, and the majority of them appear to be supplied with work for from two to four months. The inquiry for small lots for early delivery is fair, but very little is placed. We quote nominally $38 at mill.

Old Rails.—Old material of all kinds moves off very slowly, and small lots are placed only by making concessions. We quote Ts $22@$22.50.

Scrap is dull and weaker. We quote nominally, $23.50@$24, though sales are made under special circumstances at lower figures.

Philadelphia. May 17.

The Eastern Pennsylvania iron trade is waiting for the disposition of the labor question in the West. Buying is restricted mainly to immediate, because of the uncertainties as to whether maximum production will be maintained. The consumptive requirements in the iron trade are large, but not sufficient to absorb the entire production. A heavy restriction has taken place already, in several important iron centers in the West, both in mills and furnaces. Inquiry is light and the tendency is strongly downward. The ore men have not yet yielded, and the furnace companies are in no frame of mind to close season contracts. The situation throughout Pennsylvania is unsatisfactory, but the troubles will soon be cleared up.

Pig-Iron.—Standard Foundry irons are held at $22 @$20, as usual, but a great deal of the iron sold is sold below these figures. Makers are endeavoring to sell for summer consumption, but buyers are not anxious to take any risks. Forge iron is in about the same shape. Furnace quotations run from $17 @$19, and a half a dozen large transactions were heard of at $18 for a good iron. A suspension in the West will indirectly affect this market, and hence consumers are waiting. Several furnaces have gone out of blast, and others will soon follow. There is no room for all the iron making, and there is no remedy but in suspension. Bessemer pig is not selling, and negotiations are off. Offers have been made at $21. Very little is done in foreign iron. One broker has succeeded in placing several hundred tons for summer delivery.

Muck Bars.—All the Muck Bar that was heard of this week sold at $34@$34.50. Production is a little above market requirements.

Blooms.—Sales of Blooms were made at $60 for Charcoal, although not best, and $50 is offered for Anthracite, and not taken.

Merchant Iron.—Merchant iron has hardened a little, and Best Refined is selling at 2·20@2·30c., but there is no difficulty in getting good iron at 2·15c. Some offers have been made at 2·10c. and may possibly be placed in country mills where the quality is not the very best. Four or five orders for ordinary iron for car use were placed this week in country mills in small lots at 2c. 1·90c. has been offered. The car-works are well supplied with orders, and the manufacturers supplying this demand look for steady work through the summer. Nails are strong and active. The assortments are broken up, and deliveries are made in car-load lots down to 10-keg lots. Bottom prices are $3, and outside mill prices $3.25. Stores are doing a good business supplying building demand

Plate and Tank Iron.—Prices are feverish, and large orders very exceptional. Tank is quoted at 2·40c.; Shell, 3¼c.; Flange, 4¼c.

Structural Iron.—The mills manage to keep well supplied with business at 2·40c. for Angles; 3¼c. for Tees; 3½c. for Beams and Channels.

Sheet-Iron manufacturers report demand of a retail character and card rates 3¾@4½c. A little improvement was noticed in galvanized iron for immediate delivery.

Steel Rails are in better demand at $38@$39. Several orders were placed this week, some for July deliveries, and large orders for September. Negotiations are in hand for delivery under $38.

Old Material is without any activity. Occasional lots move at $24. Inquiries for shipment are answered at $23.50. Scrap has been moving a little more freely in consequence of heavy concessions made. Sales of No. 1 are made at $26.

Pittsburg. May 16.

Notwithstanding the positive assurance given by manufacturers, there are a good many who believe that there will be a compromise before the first of June, and that production will be maintained all the time, which will necessitate a decline in the prices of finished and construction iron. As there are no evidences of the willingness of the workmen to accept the reduction, it may be set down as a fact that there will be a strike. Manufacturers show their determination by refusing to take June orders. All have a moderate supply of iron, which, with care, will last several weeks.

A meeting was held last Friday, at which the wages

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	May 12.		May 14.		May 15.		May 16.		May 17.		May 18.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon	3.25	3.15							3.00				300
Amie Con., Co	.20	.18	.19	.17			18				.18		6,700
Argenta, Ne			1.15				1.15						600
Bar. & Walker, Ut													
Bassick, Co	8.25						8.00				8.00		250
Belle Isle, Ne											.30		200
Bodie Cons., Ca	1.05								.95		1 00		1,000
Breece, Co													
Bulwer, Ca			.60	.50									900
California, Ne	.21		.23				.23						4,900
Cal. & Hecla, Mich													
Carbonate Hill													
Caribou Con., Co	.13												300
Chrysolite, Co	1.10		1.10		1.10		1.10		1.10				1,700
Cons. Va., Ne	.50		.49		.50	.49	.50	.49	.49	.48	.55	.52	11,520
Crown Point													
Deadwood-Terra, Dk													
Dunkin, Co													
Eureka Cons., Ne	4.90				4.20	4.00	4.06		3.90	3 85	2 90	2.65	2,025
Excelsior, Ca													
Father de Smet, Dk							4 25						100
Findley, Ga													
Gold Stripe, Ca							.09						100
Gould & Curry, Ne													
Grand Prize, Ne	1.15				1.00		1.00						1,000
Great Eastern, Dk													
Green Mountain, Ca	.79				.79				.79	.77			3,200
Hale & Norcross, Ne													
Hall-Anderson, N. S							1.10						200
Hibernia, Co													
Homestake, Dk			16.25				16 00		16.15	16.00			325
Horn-Silver, Ut	6.63				6.63		6.38		6.75				725
Hukill, Co					.08	.07			.07	.06			900
Independence, Ne	.56								.50	.46	.41	.40	1,500
Iron Silver, Co	3.00	2.90			3.00	2.90	3.00		3 00	2 9	3.05	3.00	3,738
La Plata, Co													
Leadville C., Co			.64		.63	.60	.65	.62	.60				2,200
Little Chief, Co	.52		.50		.51	.50			.51	.50			2,900
Little Pittsburg, Co	.61	.60	.65	.57	.65		.89	.70	.91	.79	.89	.87	5,980
Martin White, Ne													
Moose, Co													
Navajo, Ne			2.40		2.20	2.10	2.10		2.15	2 00	2.00		2,375
Northern Belle, Ne	7.00	6.75	7.00	6.50	6.50	6 38	6.63		7.00	6.50			1,750
North Belle Isle, Ne													
Ontario, Ut	25.50	25 00	24.00		24.75		24.50						925
Ophir, Ne													
Plumas, Ca													
Prussian, Colo													
Quicksilver Pref., Ca					40.00								100
" Com., Ca			8.13	7.75									125
Rising Sun, Ca													
Robinson Cons., Co	.89	.86	.89	.83	.86	.85	.85		.86		.87	.86	10,175
Savage, Ne													
Sierra Grande, N. M	1.25		1 25	1.20	1.15		1.15	1.00	1.00				4,700
Sierra Nevada, Ne	4.00	3.90	4.05		4.25	4.00	4.65	4 50	4 65	4.60	5.75		1,367
Silver King, Ar											10.88		40
Spring Valley, Ca													
Standard, Ca			6.50						6.25	6.00	6.50	6.00	440
Stormont, Ut													
Tip Top, Ar													
Tombstone, Ar													
Vizina, Ar													
Yellow Jacket	3.75												10

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.										SALES.
	May 12.		May 14.		May 15.		May 16.		May 17.		May 18		
	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	H	L.	
Advance													
Alta-Montana, G									.04				200
Am. Flag, s													
Barcelona, G													
Bear Creek													
Central Con., G													
Belvidere													
Best & Bicher, G. S.	3.90								3.75		4.25		350
Big Pittsburg, S. L													
Bondholder													
Bradshaw, S		.41									.35		300
Buckeye													
" pref													
Bull-Domingo, S. L									.06				100
Bye and Bye													
Calaveras, G													
C'lav'r's W. & M. Co													
Cal., B. H., G	.75		.75								.80		290
Central Ariz'na, S			.39						.30				500
Cherokee, G	.04												300
Climax, Co	.09												1,300
Cons. Imp'ri'l, G. S.	.08												1,500
Crowell, G													
Dahlonega, G	.02												100
Decatur							.04		.05	.04	.05	.04	22,200
Dunderberg													
Durango, G													
Eastern Oregon													
Elko Cons	.20										.21		2,500
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G													
Goodshaw, G													
Granville, G													
Harlem M. & M. Co	1.45		1.45		1 45		1.45	1.40					1,400
Hortense, S													
La Crosse, G	.13	.12	.13		.13		13		.13		13		6,500
Lucerne													
Mariposa Pref., G													
" Com., G													
Mexican, G. S	2.75				2.85		3.00				3.00		600
Miner Boy													
Mono													
North Standard, G													
N. Horn-Silv'r, S. L													
Ori'nt'l & Miller, S	.14				.14		.15	.14					3,700
Quartz Creek													
Rappahannock, G	.07		.08	.07			.08				.07		5,700
Red Elephant, S													
Ruby, of Arizona													
Silver Cliff, S	.18										.20	.18	2,500
Sonora Con	.40	.36	.43	.40	.40	.39	.41	.39	48	.42	.49	.45	98,500
South Bodie, G													
South Bulwer, G													
South Hite									.15				500
South Pacific											.05		900
State Line, 1 & 4, S													
" Nos. 2 & 3, S													
Sutro Tunnel	.21	.20	.20				.20		.20		.21	.20	8,900
Taylor Plumas													
Unadilla, S													
Union Cons., G. S	4.05		4.00		4.00						5.13	4 50	730
Vandewater													
Washington													

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 75,230. Non-dividend shares sold, 162,470.

BOSTON MINING STOCKS.

	May 11.		May 12.		May 14.		May 15.		May 16.		May 17.		Sales.
	H.	L.	H	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez			2.00						2.0				150
Amie													
Atlantic							10.75						10
Aztec							.05						100
Bodie Con													
Bonanza D	2.13		2.13		2 1-16		2.13	2.00	2.00				695
Bowman Sil	.15	.13	.15		.15	.14	.15		.16	.15			18,041
Bruns. Ant	12.00												10
Bulwer	.60												200
California			.21				.21						500
Cal. & Hec					234		233		234		234		55
Catalpa	.72½	.70	.75		.72½	.72			7		.65		2,375
Central Ariz													
Cherryfield													
Co. Virginia	.51				.50								700
Copper F'lls													
Copperop													
Crescent							.25						500
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas			.80										100
Duncan													
Dunkin	.28	.27	.27				.27	.24					800
Empire							.23	.22	.22	.20			620
Eureka Con					4.88								25
Franklin									.10¼	.10⅛			50
Hancock C													
Harshaw					.50						.56¼		100
Huron													
Independ'ce													
Indian Q'n													
Mammoth													
Mass. & N. M	.08	.07	.08		.08	.07	.08		.08				9,500
Milton													
Napa													
National													
North. Belle							6.50						50
Ontario													
Osceola	21.00				21.00				21.00				37
Penn-Breck													
Pewabic													
Pine Tree													
Plymouth							.18		.19				1,200
Quincy	44⅞	43¾	44⅞	43⅝	43.0		43.00		43.00				329
Ridge	.65				.75								400
Robinson													
San Pedro							.50		.47½	.45			250
S'ra Nevada													
S'ra Grande													
Silver Islet													
Silver King													
Simpson Gd													
So. Pacific													
Standard			6.50										10
Sullivan													
Sutro Tun	.20		.20		.21		.21		.19				1,000
Sycamore													
Twin Lead	.05		.05										2,500
Vizina													

PHILADELPHIA MINING STOCKS.

	May 11.		May 12.		May 14.		May 15.		May 16.		May 17.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L	
Argent	.17		.17		.17		.16		.17				20,000
Battle Mt			.04				.03				.03		2,000
Black Sul													
Bodie													
Buena			.03				.03		.03		.02		23,000
California													
Calista													
Chrysolite			1.05										1,800
Cincinnati	.09		.10		.12		.13	.11	.13		.12		14,625
Comprom'e													
Contention							3.87½						1,500
Con. Virg	.50		.52½										3,100
Dauntless													
Denver City	.19	.18	.19	.18	.19		.19		.18		.18		6,600
Fairview													
Eureka	.01												4,000
Girard	.10				.10		.10		.10	.09	.10	.09	10,100
Golconda													
Governor	.09				.09		.09		.09		.09	.08	24,100
Grand Uni'n			.14				.20		.21		.23	.21	14,000
Gunnison	1.12½		1.05	.97½	1.02½	.95	.85	.80	.87¼	.82½	.87½		9,200
Homestake													
Horn Silver	6.75												300
Iowa Gulch	.08		.07		.07		.07				.07		10,500
Iron Silver	2.87½						3.10		3.00				3,500
King Bul'on	.01												2,500
Ledger Con	.02												5,000
Little Dia'd													
Little Maud							.06	.05			.06		1,700
Little Pitts													
L'g & D'y H													
Montana													
Mt. Lincoln													
Navajo													
North'n B'l			7.50										300
Orion													
Orion Pref													
Palmetto E													
Pembina					15								500
Penn-Breck	.13	.12			11		.11				.11		7,500
Permanent	.02		.02						.02		.03		15,500
Pizarro			.01										1,000
Pizarro Ex	.02		.02										4,000
Potosi													
Rara Avis			32½										1,000
Rara Avis E	.11		.11		.11		.12	.11	.11		.11		18,300
Record													
Rico Pion'r													
Robinson	.90						.85		.85				4,800
San Pedro													
Sierra G'nde	1.30	1 25	1.25	1.15	1.15	1.10	1.12½	1.05	1.05	1.00	1.05	1.02½	16,600
Sierra Nev					4.95				4.25				1,100
Silver Cord	1.67½				1.75		1.75						5,100
Silver King			.02										250
Silv'r Plume					10.5								5,000
Sovereign													
Standard													
Sultana					.04		.04		.04				5,000
Sutro Tun'l			.20										600
Tombstone	.75		.77½		.75		.77½	.75	.77½				3,500
Victor			.02		.02		.02		.02		.02		12,000
Yale Mt			.05										1,000

question was thoroughly discussed. Preparations are making to secure non-union men. The ore question remains unsettled; but in view of the probability of a suspension, furnace companies are not pushing negotiations. Lake Ore Foundry is selling at $22.50; Charcoal, $29; Mill iron; $17.75@$18.50. Large offers have been made, and negotiations are pending.

Stocks in consumers' hands are low. Muck Bars are $34.50@$35. Orders for Merchant Bars are coming forward freely. Assorted orders are filled at 2c., and customers are providing themselves against a scarcity Manufacturers of nails are refusing to book orders for future deliveries. Car-load lots are selling at $3, and jobbing lots at $3.15. Sheet-iron is in active demand, and requirements for galvanized are depleting stocks.

Cleveland. May 15.

The market for the last week has been quiet, although a fair amount of business is done in Foundry iron. There are still some off grades iron that are pushed, but most holders are willing to keep their metal unless ruling prices can be obtained. We quote:

No. 1 Bessemer	$22.00@$23.00
" 1 Foundry, all ore	21.00@ 22.00
" 1 Foundry, cinder mixture	20.00@ 21.00
" 1 Soft Foundry	20.00@ 21.50
" 1 Open Silvery	19.50@ 20.00
Mill irons	18.00@ 19.00
4 months f. o. b, cars furnaces.	
Nos. 1 and 2 Charcoal	$24.00@$26.00
" 3, 4, 5, and 6 Charcoal	25.00@ 26.50
Hanging Rock Charcoal	23.00@ 25.00
Strictly Cold-Blast Charcoal	28.50@ 30.00
4 months f. o. b. cars Cleveland.	
Bessemer ores	$7.00@ $8.00
Hematite ores	5.00@ 6.00

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 18.

Anthracite.

There is very little that is new to report in the anthracite coal trade, beyond the fact that the companies have decided to work half-time next week, full-time the following week, half-time the week ending June 9th, full time the week ending June 16th, and half-time for the four weeks following. This shows that the companies are decided to check over-production, though they do not seem to be able to agree upon the more decisive step of stopping work altogether for one or two full weeks.

Some buyers seem to look forward to a possible rise, and are getting more liberal in their purchases, and inquiry has been a little stimulated; but it would be idle to deny that the great body of purchasers is still absolutely indifferent, and until the low-priced coal has entirely disappeared from the market, which it has not yet, there is little hope for a change in their attitude.

Bituminous.

The last contracts have been closed and the market is dull and lifeless. The rumors of the cutting of rates on the Baltimore & Ohio Railroad are substantiated, and we hear of low prices at Baltimore. Buyers, learning of the low figures at which the large contracts have been placed, insist that they should at the utmost pay 15 to 20 cents more, and the anxiety notably of shippers of Cumberland coal via Baltimore to place tonnage gives them encouragement. We quote Clearfield alongside, $4@$4.25; and Cumberland, $4.10@$4.40, according to quality.

STATISTICS OF COAL PRODUCTION.

Belvidere-Delaware Railroad Report for the week ended May 12th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	1,752	21,187	12,338
Coal for shipment at South Amboy	10,167	300,688	271,023
Coal for distribution	10,270	287,841	243,955
Coal for company's use	1,776	52,910	47,355
Total	23,965	662,626	574,671
Increase		87,955	
Decrease			

Comparative statement of the production of anthracite coal for the week ended May 12th and year from January 1st:

Tons of 2240 lbs.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	51,296	1,203,779	40,836	1,045,477
D. L. & W. RR. Co.	71,814	1,521,793	61,411	1,347,184
Penna. Coal Co.	17,587	415,869	21,719	357,372
L. V. RR. Co.	9,055	350,352	10,573	335,288
P. & N. Y. RR. Co.	3,566	66,928	3,039	64,172
C. RR. of N. J.	36,583	822,348	31,134	744,937
Penna. Canal Co.	16,214	64,687	10,713	71,905
North & West Br. RR.	5,502	174,664		
	211,617	4,620,430	179,425	3,966,305
Lehigh Region.				
L. V. RR. Co.	72,071	1,586,635	75,199	1,429,295
C. RR. of N. J.	34,546	748,387	37,052	672,377
S. H. & W. B. RR.	3,064	15,153		15,000
	109,681	2,350,175	112,251	2,116,672
Schuylkill Region.				
P. & R. RR. Co	107,437	2,203,513	110,565	2,015,162
Shamokin & Lykens Val.	26,127	452,462	25,473	370,574
	133,564	2,655,975	136,038	2,385,736
Sullivan Region.				
N. Y. Line & Sul. RR. Co.	1,160	21,219	1,038	18,257
Total	456,022	9,647,799	428,752	8,486,970
Increase		1,160,829		
Decrease				

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878 ..... 4,858,034 tons.
" " " " 1879 ..... 8,120,260 "
" " " " 1880 ..... 7,540,846 "
" " " " 1881 ..... 8,912,430 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 133,343 tons, as compared with the corresponding period in 1882.

The Production of Bituminous Coal for the week ended May 12th was as follows:

Tons of 2000 lbs., unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs	49,775	731,187
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	6,554	123,976
Broad Top Region, Pa.		
Huntingdon & Broad Top RR.	2,143	75,922
East Broad Top	485	19,634
Clearfield Region, Pa.		
Snow Shoe	4,694	92,333
Tyrone and Clearfield	47,655	999,316
Alleghany Region, Pa.		
Pennsylvania RR.	4,953	176,487
Pittsburg Region, Pa.		
West Penn RR.	8,190	176,731
Southwest Penn. RR.	1,877	44,482
Penn & Westmoreland gas-coal, Pa. RR	28,426	504,794
Pennsylvania RR.	2,720	183,28
Total	157,472	3,127,813

The Transportation of Coke over the Pennsylvania Railroad for the week ended May 12th and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	1,941	44,064
West Penn. RR.	2,584	38,385
Southwest Penn. RR	41,209	717,720
Penn. & Westmoreland Region, Pa. RR	4,495	88,832
Pittsburg, Penn. RR.	39	313
Snow Shoe (Clearfield Region)	431	7,144
Total	50,699	896,458

Circular Prices of Anthracite Coal Delivery, f. o. b., at Tide-Water Shipping Ports per ton of 2240 lbs.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
WYOMING COAL.	$	$	$	$	$	$
Pittston at Newburg	3 95	3 90	3 95	4 05	4 05	4 15
Scranton at Hoboken	3 90	3 90	3 90	4 00	4 20	4 30
Lackawanna at Weehawk'n	3 90	3 90	3 90	4 00	4 20	4 35
Wilkes-Barre at P. Johnston	3 90	3 90	3 90	4 00	4 20	4 20
Plymouth R. A. at P. John.	4 15		4 30	4 75	4 50	
LEHIGH COAL.						
Honey Brook at Port John.	5 00	4 25		4 25	4 20	4 2
Fulton at South Amboy	5 25	4 40		4 40	4 30	4 4
U. L. & Coun. Ri'ge at Eliz'pt						
SCHUYLKILL COAL. *At Elizabethport.*						
Hard White Ash	4 85	4 85	4 50	4 10	4 35	4 10
Free-Burning White Ash	3 90	3 90	3 90	4 00	4 35	4 10
Schuylkill Red Ash				4 10	4 55	4 10
Shamokin				4 25	4 55	4 10
Lorberry				4 25	4 65	4 20
Lykens Valley (Brookside)			4 70	5 00	5 25	5 00
At Port Richmond, Philadelphia, for shipment to points beyond Capes of the Delaware.						
Hard White Ash	4 50	4 50		3 75	4 00	3 75
Free-Burning White Ash		3 55		3 65	4 00	3 75
Schuylkill Red Ash				3 75	4 20	3 75
Shamokin				3 90	4 20	3 85
Lorberry				3 90	4 30	3 85
Lykens Valley (Brookside)				4 65	4 85	4 65

Wholesale Prices of Bituminous Coal.

Clearfield, at Philadelphia	$3.20@$3.30
" " South Amboy	3.80@ 3.90
" " New York, alongside	4.00@ 4.25
Cumberland, at Baltimore	2.95@ 3.10
" " Georgetown	2.95@ 3.10
" " South Amboy	3.90@ 4.20
" " New York, alongside	4 10@ 4.40

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to May 14th.

PORTS	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria	.60@.75		
Annapolis			
Albany			
Baltimore	.50§		
Bangor	1.40	1.50	
Bath, Me	1.30	1.40	1.00
Beverly	1.30		
Boston, Mass	1.25@1.35	1.40@1.50	1.00@1.05
Bristol	1.15	1.35	
Bridgeport, Conn.		1.30	.55
Brooklyn	.75§	1 25	
Cambridge, Mass.	1.30‡	1.50	1.05@1.10‡
Cambridgeport	1.30‡	1.50	1.05@1.10
Charleston, S. C.	.70	.75	
Charlestown	1.30	1.50	
Chelsea	1.30	1.40	1.05@1.10
City Point			
Cum. Pt., Mass.	1.35	1.50	1.05@1.10
E. Boston	1.25@1.30	1.40	1.05@1.10
East Cambridge	1.25‡	1.50	1.05@1.10‡
E. Gr'nwich, R. I.	1.15	1.30	
Fall River	1.15	1.35	.80
Galveston		2.90	
Georgetown, D.C.	.60@.75		
Gloucester	1.35		
Hartford			
Hackensack			
Hudson	1.00§		
Lynn	1.40	1.75	
Marblehead		1.75	
Medford			
Millville, N. J.			
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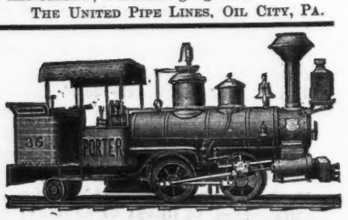

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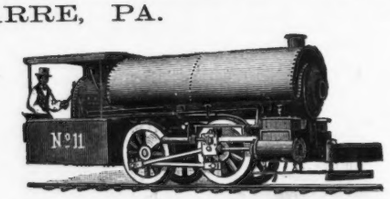

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